All Work & All Play

THE ESSENTIAL MANUAL TO FINDING HAPPINESS ON THE JOB

WIRED



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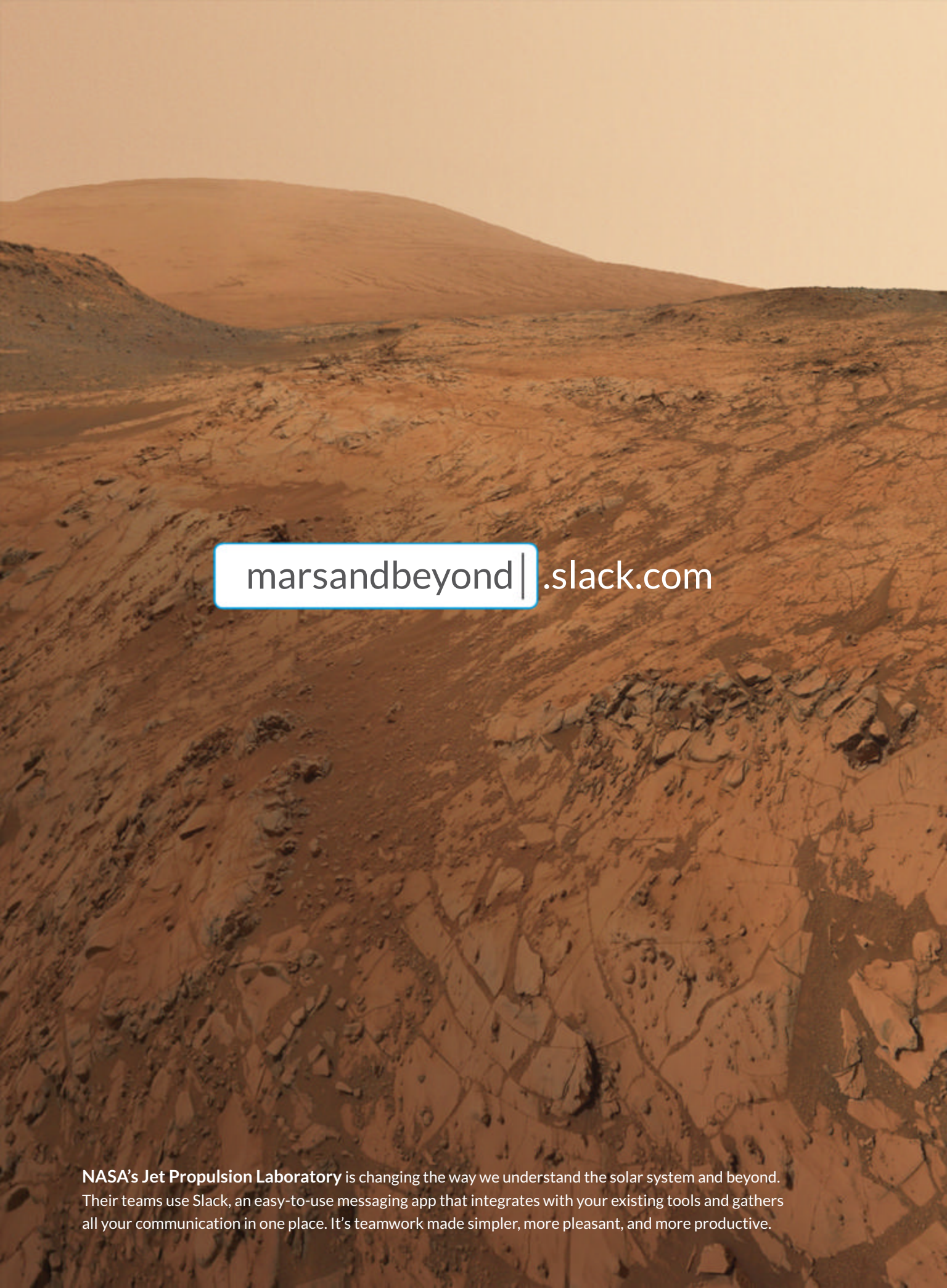
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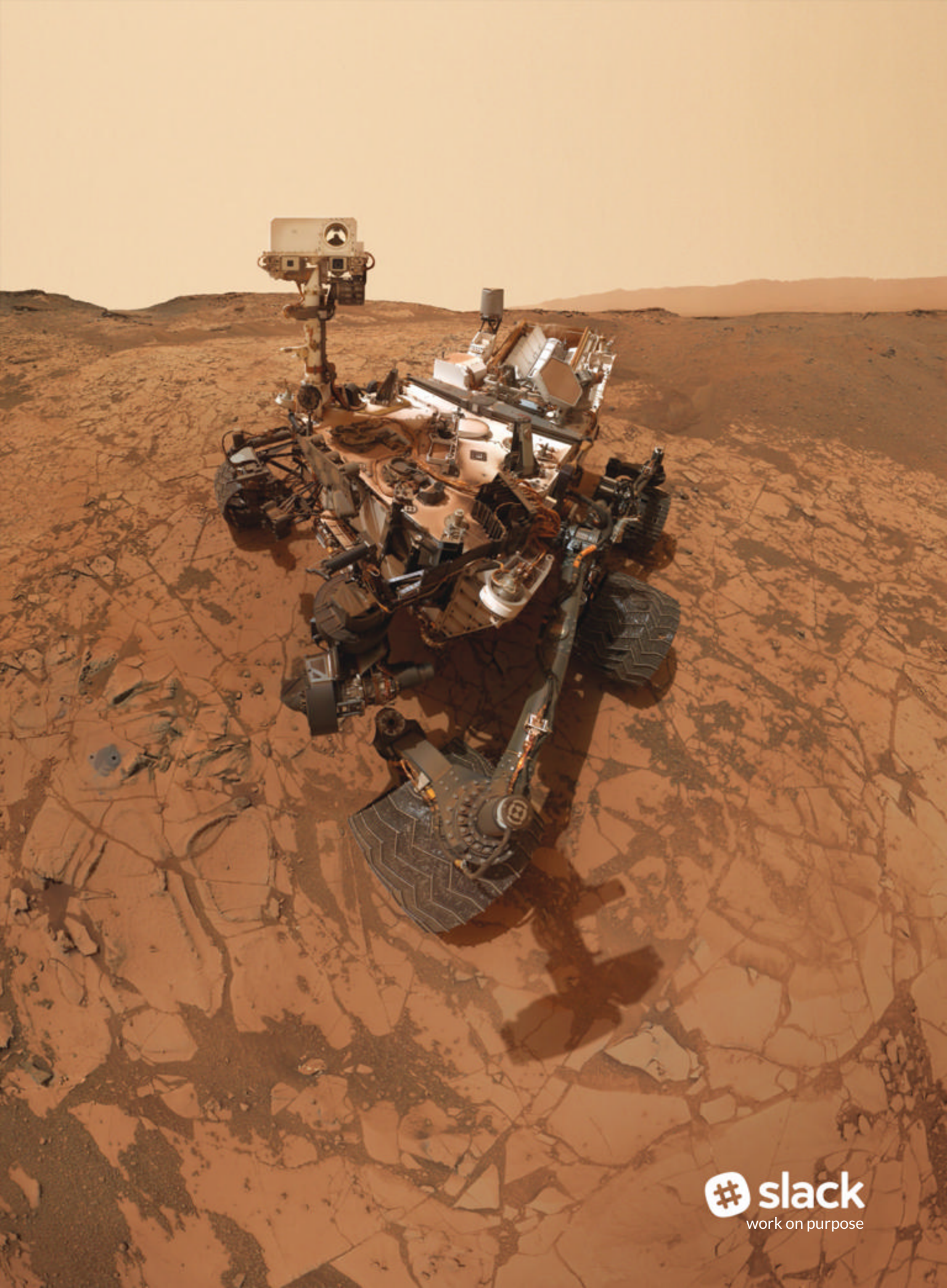
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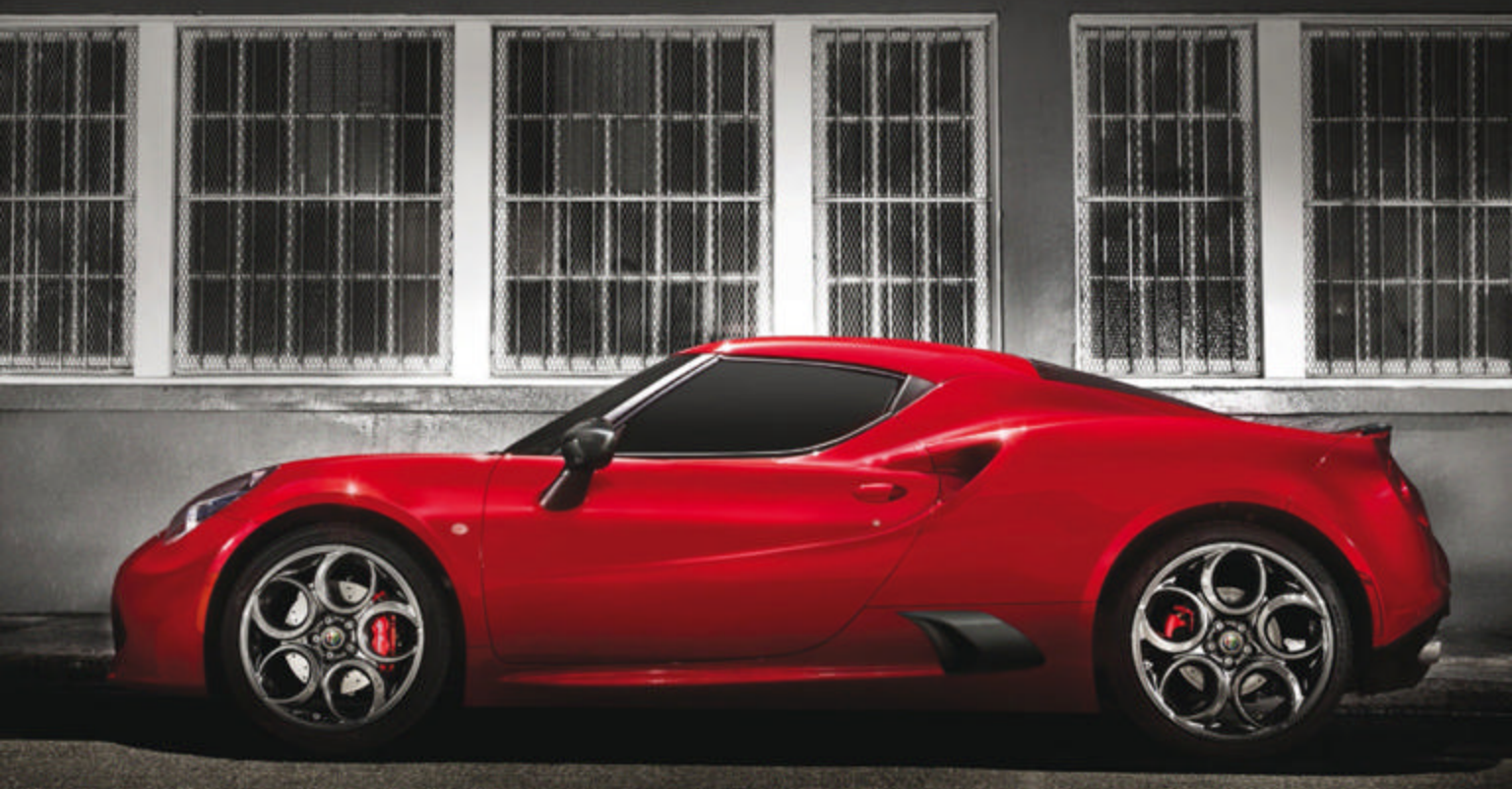


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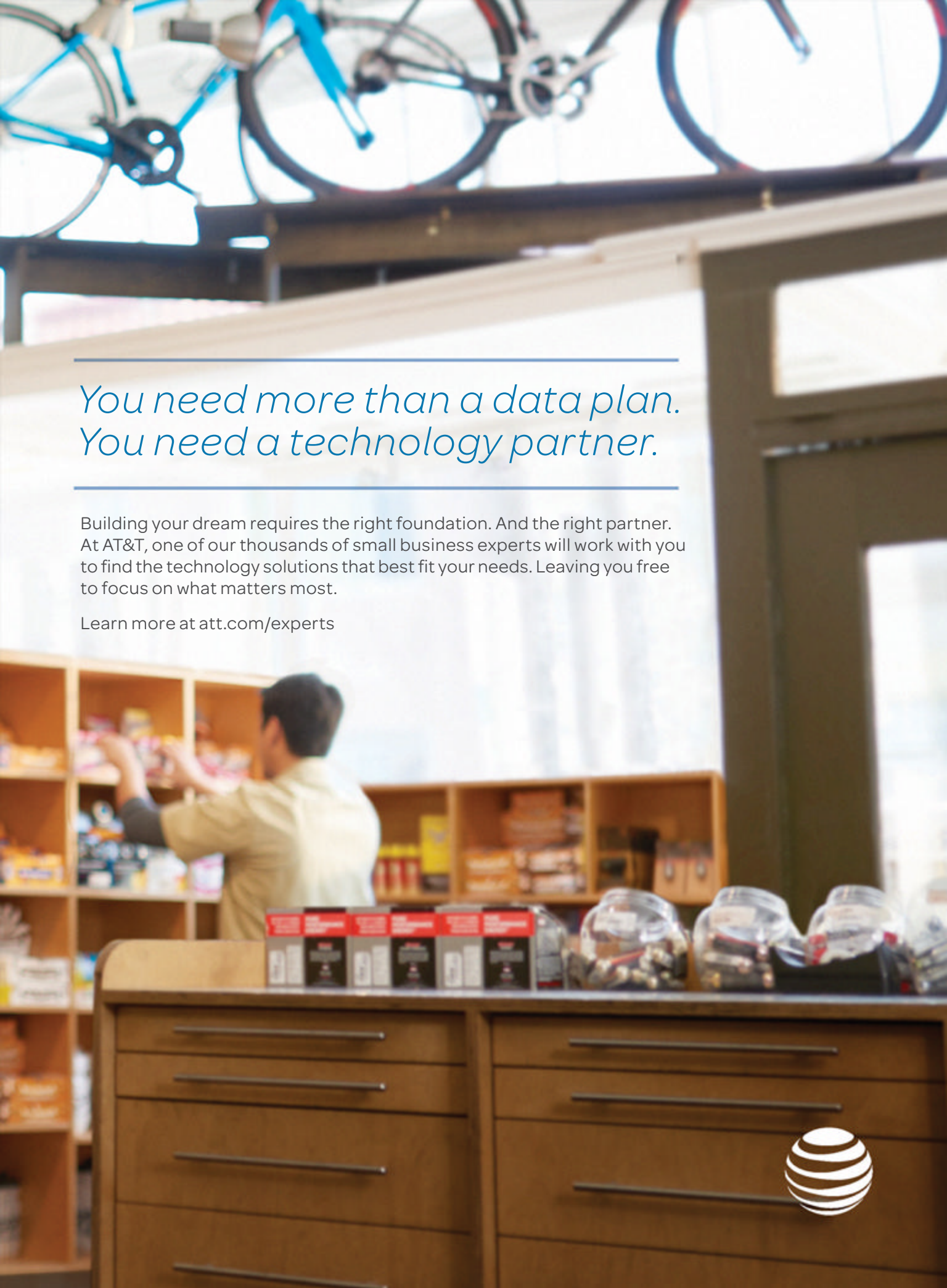
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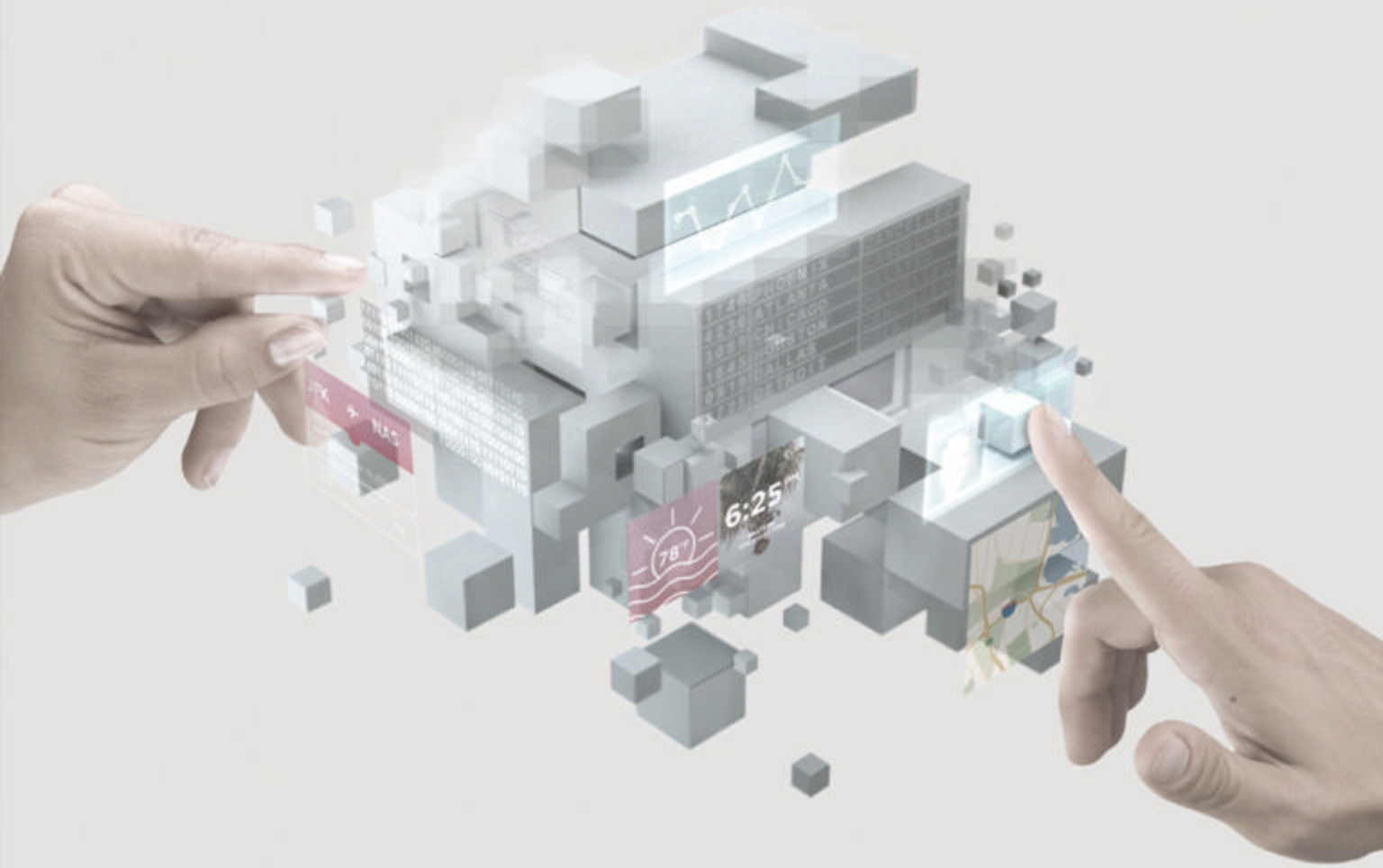
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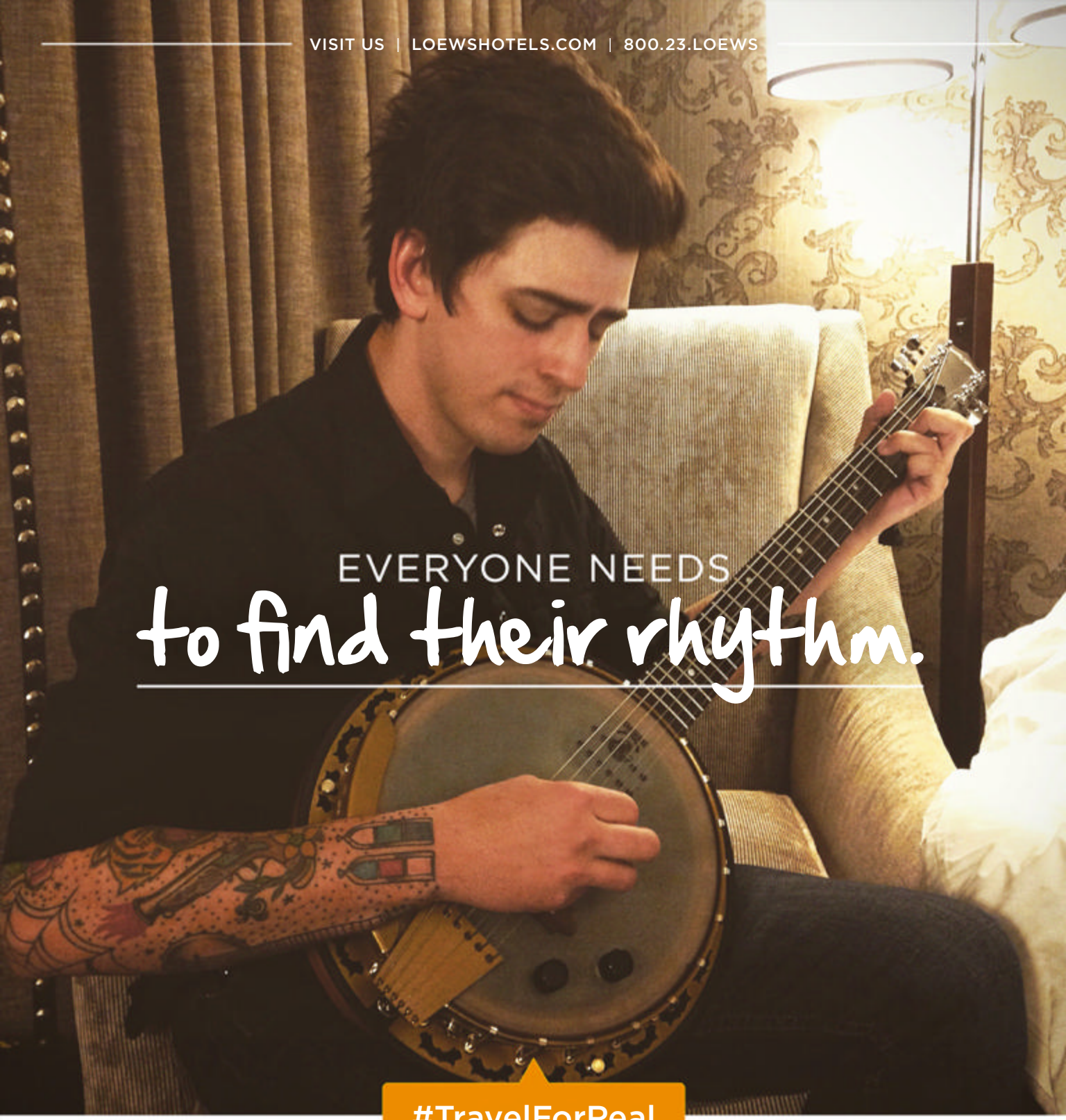
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MASTERING THE WORK-LIFE MIX

About 15 years ago my then boss, Evan Smith, the editor of *Texas Monthly*, took me to lunch. Over enchiladas with chips and salsa, he told me that he'd been impressed with my early months as a designer and that he was now offering me the job of art director. I was elated. We spent some time talking through the particulars, salary and vacation days, and Evan described his expectations of me and his goals for the magazine. But as he finished his plate, he put his elbows on the table and leaned toward me.

"Listen," he said. "From now on, you will never *not* be the art director of *Texas Monthly*." I nodded and quietly put down my fork. "This job will become you, and you will become this job. I will expect you to always answer the phone when I call, and I will expect you to always behave in a manner befitting your position. Always."

Gulp. Those words landed with their desired effect. I still remember their weight today as I type them. Evan was talking as much about how the 23-year-old Scott ought to conduct himself in the world as he was describing the hours I would commit to actual labor—both in and out of the office. He meant that work would follow me, even after I punched out for the day. He meant, in fact, that there would be no more "punching out." My job was over; my career had begun.

That lunch was the first time I felt that my work and my self had merged to become one. This was well before the age of always-on email and social media, let alone ubiquitous Wi-Fi connectivity. I didn't own a BlackBerry—or even a "car phone," as a friend liked to call them. But in that moment Evan gave me a sense of responsibility, both to my duties and to myself. He wasn't ordering me to have no personal life. He was actually giving me permission to mix the things that were important to me personally with the work that was required to get the job done well.

It turns out that for me, and for a lot of us, the idea of a work-life balance has become a false choice. It's all merged together now. I'm not the only person who thinks so. Rashida Jones—actress, writer, producer, and hilarious human—seems to have perfected that mix. In our cover package this month, she guides us through the smartest ways to find happiness not despite work but because of it, because our lives on and off the job are warp and weft in the same fabric.

One piece of advice I'll add to my pal Rashida's: I'm happiest when I'm juggling a lot of work and when I work with people I really, genuinely like. Evan Smith saw that in me. When those two states exist simultaneously—as they do here for me at WIRED—I fall into a state of work bliss. My job is my happy place. Yours can be too.



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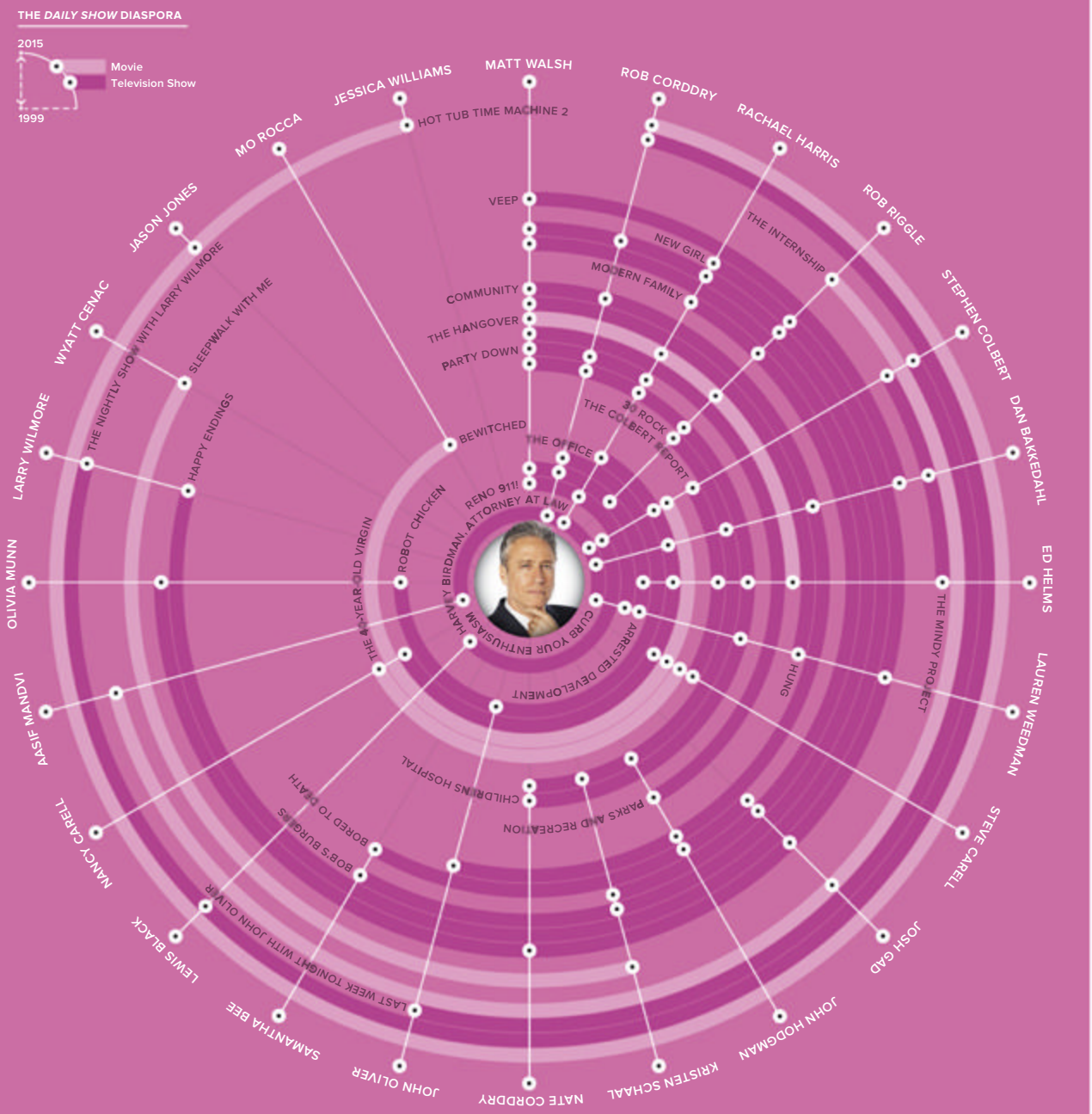
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THE DAILY SHOW A COMEDY VORTEX

SINCE JON STEWART took over hosting duties on *The Daily Show* in 1999, he and his correspondents have vaulted to super- or at least moderate stardom. Many of them made the transition from fictional news to standard TV shows like *30 Rock* and *New Girl*, and almost all of their extra-*Daily Show* careers intersect somehow. We're all going to miss Jon Stewart when he leaves next month, but at least we'll have his legacy of comedy gold. —ELISE CRAIG



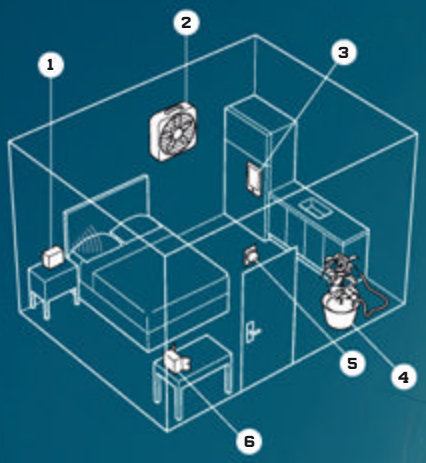
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OBSESSED

TECH, INSIDE AND OUT

In her quest to optimize her life for extreme efficiency, Alexia McKenzie deploys sensors, webcams, DIY devices—and a magnet implanted in her skin.

ALEXIA MCKENZIE IS surrounded by chronic time wasters. They check their mail when they get home. (*Typical.*) They answer the door when someone knocks. (*Lame!*) They even do their own laundry. (*Why?*) McKenzie wants none of this. ¶ If there's a way to eliminate an inefficiency, McKenzie will find it. She installed a sensor that tells her when a letter arrives. A webcam livestreams a view of her doorstep to her phone, so she always knows who's knocking. As for laundry, she doesn't bother—don't you know there's an app for that? After years of testing and tinkering, McKenzie has transformed her life into a smooth operation managed by apps and hardware. She Lyfts to work, keeps a tablet open to Instacart on her fridge (she never runs out of eggs), and waters her plants remotely. Rigging all this stuff can get complicated, though, so she's taken optimization one step beyond: McKenzie had a tattoo artist implant a magnet under the skin of her left hand to hold metal parts as she works. "I'll be fiddling with a wire or a screw, and I'll be like, live there for a moment," she says, pointing to the spot. Then she shows off, using another magnet to make the one in her hand spin in circles: "I can make it dance!" ¶ Now McKenzie, who works for a hardware design firm in San Francisco, is helping others streamline their lives. Her mom doesn't like getting out of the shower, so McKenzie made her a heated bath mat to ease the transition. When people invaded a local community center, she set up a lock system and distributed keycards to the other members. Of course, McKenzie doesn't need one herself. She has a radio tag embedded next to her magnet—the key is always in her hand. —MALLORY PICKETT



SMART HOUSE RULES

Here's how Alexia McKenzie automates her life.

1. Her DIY "brainbox"—its speaker shown stuck to her underskin magnet (right)—emits sound waves that help her fall asleep.

2. Her fan switches on at a specified temperature.

3. Instacart stays permanently open on her fridge.

4. A homemade irrigation system waters her plants.

5. A webcam tells her who's knocking at the front door.

6. A sensor pings her when a letter arrives.

IAN ALLEN

ILLUSTRATION BY JASON LEE

BEN & JERRY'S cookie Core

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Our new Cookie Cores have a uniquely spoonable cookie center surrounded by chunk-filled ice cream. It's a whole new way to love cookies. So start spooning.

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JARGON WATCH

Great Cannon
n. / 'grāt 'ka-nən /

China's newest cyberweapon, it's the offensive counterpart to the Great Firewall. The Great Cannon intercepts traffic to Chinese sites like Baidu and redirects it as a DDoS attack against foreign sites that attempt to undermine the regime's censorship.

placebome
n. / plə-'sē-ˌbōm /

The network of at least 10 genes that predisposes people to the placebo effect. Understanding how the placebome makes someone respond to sugar pills as if they were medicine will help doctors personalize treatments, a long-standing goal of the Human Genome Project.

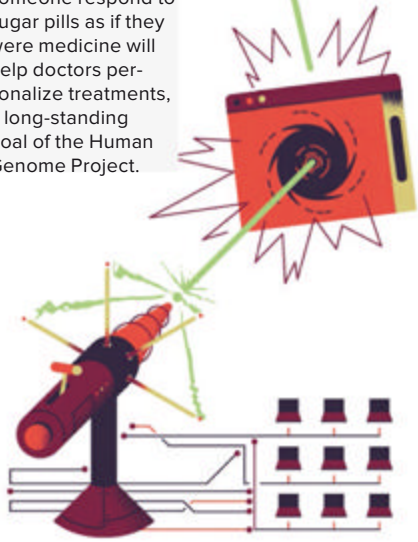
rainpower
n. / 'rān-ˌpaú-ər /

The frictional effect of rain on the power of a hurricane. Tropical cyclones, which suck up water from the sea, can pour down 500 billion gallons a day. The resulting friction can slow a storm by an average of 20 percent. Rainpower calculations will improve the accuracy of hurricane predictions.

blue crude
n. / 'blü 'krüd /

An engine fuel made from water and carbon dioxide. Blue crude is a liquid hydrocarbon synthesized by combining the hydrogen from H_2O with the carbon from CO_2 under high pressure and heat. It can be refined to make a carbon-neutral diesel for cars and trucks.
—JONATHON KEATS
*jargon@*WIRED*.com*

ILLUSTRATION BY ANDREA MANZATI



THE ROAD TO PLUTO
A LOOK BACK AT NEW HORIZONS

BACK IN 1989, planetary scientist Alan Stern faced a challenge. He wanted to send a probe to Pluto, but time wasn't on his side: Unless he got it launched by 2006, humankind would have to wait about two centuries for another good shot at the king of the ice dwarfs. And he had no money. NASA was moving slowly, so Stern appealed to the Russians (that didn't work out). Eventually NASA ponied up $723 million, and in 2006 the piano-sized New Horizons craft became the fastest probe ever rocketed into space, whizzing along at speeds up to 36,450 miles per hour. Now it has nearly completed its 3 billion–mile journey and will pass closest to the planet on July 14. Photographer Michael Soluri has been documenting the mission since 2005, just before the launch, and he'll be shooting the operations and science teams until after the flyby. The images and data that New Horizons sends back will take more than four hours to reach Earth, but it's worth the wait. —SARAH FALLON

The interplanetary probe spins in flight to save fuel. Here, NASA engineers test New Horizons at 60 revolutions per minute. They used small weights to correct imbalances.



MICHAEL SOLURI



Alan Stern, right, is the principal investigator of New Horizons. He's holding a 1994 Hubble image of Pluto and a few of its moons. Ed Stone, left, was the project scientist for the Voyager mission. He's holding an image of Neptune taken by that probe in 1989.



The January 2006 launch of New Horizons began an almost 10-year journey across the solar system.

Q&A WITH THE MAKER

The Maker, WIRED Insider's DIY expert, sat down with **Grant Imahara**, of Mythbusters fame, to talk about the future of robotics, space exploration, home automation, and how Mouser is providing that spark for future generations of engineers through the Empowering Innovation Together program.

Q What did you think when you got the call from Mouser and what is the Empowering Innovation campaign about for you?

A I've been a Mouser customer for 25 years. It's a company I believe in and have had great experiences with. By partnering with Mouser, I'm able to inspire future engineers, push technology forward and make engineering fun. Mouser makes it so easy to get parts, and with all the resources we have nowadays—from online videos to maker-type communities—Mouser stimulates creativity and enables people to explore what's going on in their imaginations.

Q What was it like visiting the Carnegie Mellon robotics department?

A They're really pushing it and I think all the sciences can benefit from what they're doing. They're working on technology that could send robots into high-risk areas which would be dangerous for humans, like nuclear clean-up sites and active volcanoes. These are perfect jobs for robots.

Q Where do you see robotics going in the future?

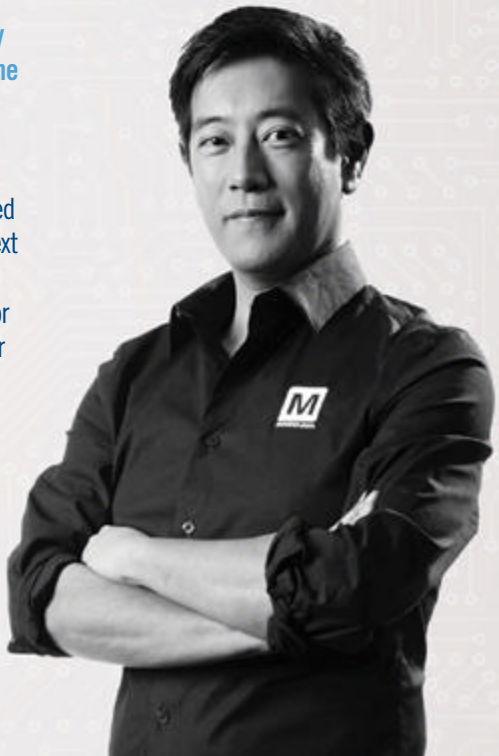
A There are so many areas where robotics can be integrated into everyday life—smart homes are definitely coming. Right now I have a robot that cleans my floors. Going forward, I think we're going to see incredibly powerful processing in small packages. But what's even more important is what's happening with battery technology because you can't always be tied to a grid. In many cases, robots will need to perform tests autonomously and untethered. For example, when I visited Carnegie Mellon, they've developed an incredibly dexterous robotic snake which can be used for archaeology.

Q Has your experience with the Space video series given you any insight on space exploration in the real world?

A As far as space exploration today, I think everyone is looking toward Mars. It's like the way people looked at the moon in the '60s. It's the next frontier. But there are significant problems with getting to Mars—or perhaps getting back is the bigger problem. I feel that, within my lifetime, there will definitely be a man mission to Mars.

Q After experiencing some of the most cutting-edge technologies, what are you most looking forward to?

A There are so many things that I cannot wait to have. I'm most excited about driverless cars. Right now I have a feature that is an assisted cruise control. I can say I want to be anywhere from 1 to 5 car lengths from the car in front of me, and it will sense the vehicle ahead and slow down or speed up to maintain that distance. We're just two steps away from driverless cars, which is really exciting. The other thing I want is a replicator. There are a lot of people who enjoy cooking—I'm not one of them. I want 3D-printed food.



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TIPS FROM A POKER ACE

THE WORLD SERIES of Poker is no joke. Last year, the 46-year-old tournament pitted more than 6,000 players against one another, vying for just nine spots at the final table and the chance to win $10 million. Finalists are determined each July, then four months later they battle their rivals for the series win. We asked the 2014 champ, Martin Jacobson, how he trained during that break— so that you too can dominate at poker (night). —ELISE CRAIG

Work Out With Living Opponents

Jacobson needed to play as much as possible against high-caliber rivals, so he put together a Skype group and an online sim with 30 of his poker-playing friends (and their friends). They played round after round, discussing tough hands and new approaches, so nothing would faze him.

Scrutinize the Competition

Poker is above all a mind game. Jacobson studied news coverage of past events and videos of each player, compiling detailed profiles that outlined individual styles, like bluff frequency, willingness to take risks, and how likely someone was to fold. Then he assigned each of his friends a character to imitate during the online simulations.

Yoga and Conditioning

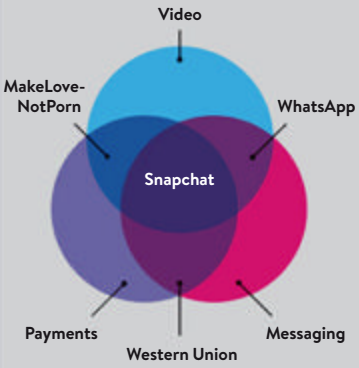
Poker is also an endurance sport. The final takes up to 24 hours, with 20-minute breaks every two hours. Physical fitness is key, so Jacobson mixed cardio and strength training, plus yoga and meditation. "Poker is a constant form of stress," he says. "Meditation calms your nervous system and helps you focus."

Find Your Tells

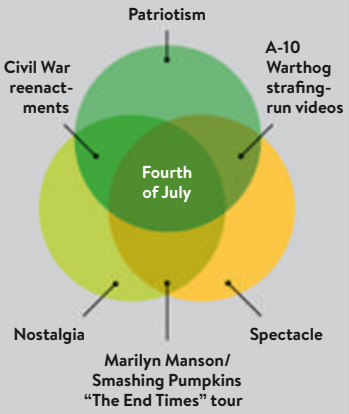
All that meditation means Jacobson has enough control to maintain a poker face. But a friend did have one criticism: While he didn't have a physical tell, he unknowingly made decisions more quickly when he had a good hand. Not any more.

CHARTGEIST

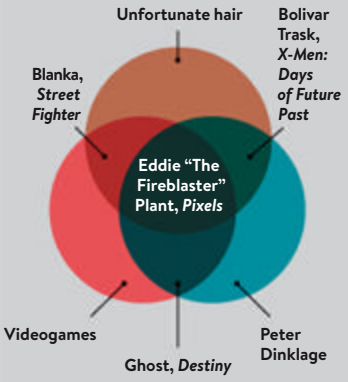
Platforms



Diversions



Characters



CHARTGEIST CONTRIBUTOR: JON J. EILENBERG









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LG G4

www.LG.com/G4

Qualcomm snapdragon

LG

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WHAT'S INSIDE

FIREWORKS

LIGHT AND SOUND IN A PAPER TUBE

ADAM VOORHES

Black Powder

Invented in ninth-century China, this mix of potassium nitrate, charcoal, and sulfur is what makes fireworks (plus guns and explosives), well, *work*. In a traditional firework a lit fuse kicks off the reaction, igniting the powder in the bottom of the shell. As the potassium nitrate burns, it lets off oxygen. The O_2 helps the charcoal and sulfur burn too, producing hot gases that hurl the firework into the sky. Seconds later, a delayed fuse reaches the center of the payload, igniting the main shell to unleash a spectacle of light and sound.

Metal Salts

The rockets' red glare as fireworks burst in air is simple chemistry: luminescence! As pellets containing metal salts inside the payload heat up, their electrons get excited and release excess energy as light. The amount of energy each substance produces when burned determines the color you see. Want red, white, and blue? Burn strontium carbonate, magnesium alloy (not a salt), and copper chloride. For greens, oranges, or yellows, use barium chloride, calcium chloride, and sodium chloride.

Dextrin

This starchy stuff is often used to bind black powder and metal salts into pellets that explode into colorful stars. The all-purpose water-soluble powder is also used as a binding or thickening agent in paint, processed meats, food glazes, and envelope adhesives. It can even replace fat in milk products. Ew.

Antimony Trisulfide

A dark gray powder, this is added to some star-pellet mixtures to create a glittery effect. It's also found in safety matches and camouflage paints (Sb_2S_3 helps them reflect infrared!). The powdery particles can cause respiratory problems if inhaled—they've also been shown to cause lung cancer in rats.

Paper

Cheap, easy, and environmentally friendly, paper (or cardboard) is the perfect packaging for firework shells. It burns quickly and leaves little residue behind. Plus it's good at trapping hot gases but readily gives way for an explosion. Inside the shell, the hot gases expand rapidly, building up pressure until they rip through the paper and create a loud boom. The more packed the payload, the louder the BOOM.
—JULIA GREENBERG

STYLING BY ROBIN FINLAY







WELL ARMED

The LG Watch Urbane, the Genuine Smartpiece. Equipped with Android Wear, it can send texts, deliver notifications, give turn-by-turn directions, sync and play your favorite tracks, and more. With its interchangeable leatherstraps and classic gold or silver finishes, it proves the future of innovation can indeed be timeless.

android wear

Genuine Smartpiece

LG Watch Urbane



LG

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Android Wear is a trademark of Google Inc.

FIRST TO MARKET: REMODELING

Times are good, and you've got a few grand to replace those front steps. Multiply that by a brickload of other Americans replacing their front steps and you've got a $300 billion home-improvement industry that's forecast to grow. A new group of startups are eager to lend a hand, and VCs are eager to lend them some bucks. —VICTORIA TANG

Houzz

$165 million raised in a Series D round, October 2014

This one-stop shop for remodeling and decorating sure beats tearing pages out of magazines. Users can peruse more than 6.5 million photos to discover the perfect wainscoting without driving themselves up the wall.

Porch

$65 million, Series B, January 2015

Hire vetted professional painters, landscapers, and handypersons through this website, which lists ratings, reviews, and photographic evidence of their work. Like Yelp but with more spackle.

Cylindo

$1 million, seed, March 2015

Double-wide leather couch. Does it make the room or dwarf the place like a cowhide Death Star? This furniture visualization company lets you play around with a 360-degree view of your space before doing any heavy lifting.



ANDREW GROVES

SOUND SCAN
MUSIC IN AN MRI

PLAYING MUSIC COMBINES complex brain work with feats of coordination. Scientists would love to know how musicians pull it off—just what happens to a pianist's brain while recalling Rachmaninoff or to a sax player's tongue while riffing? Of course, you can't just shove an orchestra into an MRI machine. But you can reinvent musical instruments to be compatible with its superconducting mega-magnets. That means nothing too big for the tube, no electronics, and no iron-based bits. Here are some instruments that researchers have tuned for a magnetic performance. —DANIELLE VENTON

Piano

How it works
The keyboard is a shortened 11-key version with optical sensors underneath that connect to a shielded processor.
What it does
Allows researchers to compare brain activation in pianists as they listen to music and then try to play what they heard.

Trumpet

How it works
Forget brass; this one is plastic, paired with a right-hand glove studded with optical sensors.
What it does
Tracks players' movements and brain activity so researchers can correlate finger positioning and lip pursing with neural activity.

Harmonica

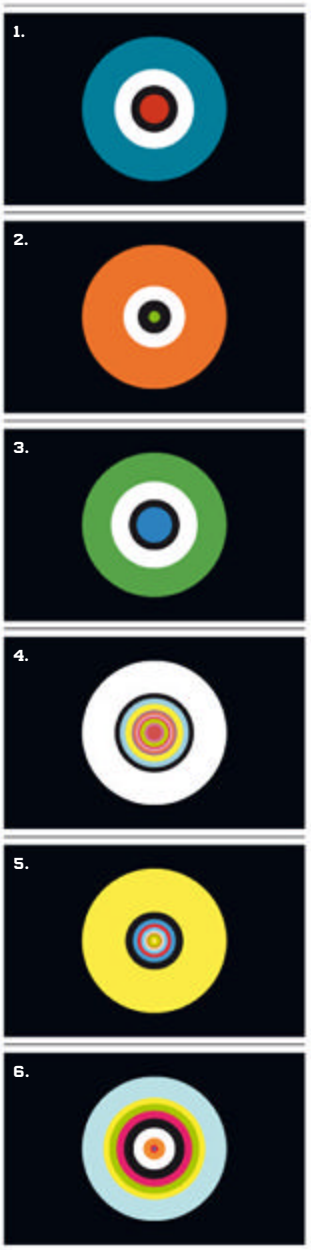
How it works
Plastic replaces the metal body; the plates and reeds are nonferrous aluminum.
What it does
Reveals the various shapes assumed by harmonica instructor David Barrett's tongue while he plays hard-to-execute "bent" notes.

Cello

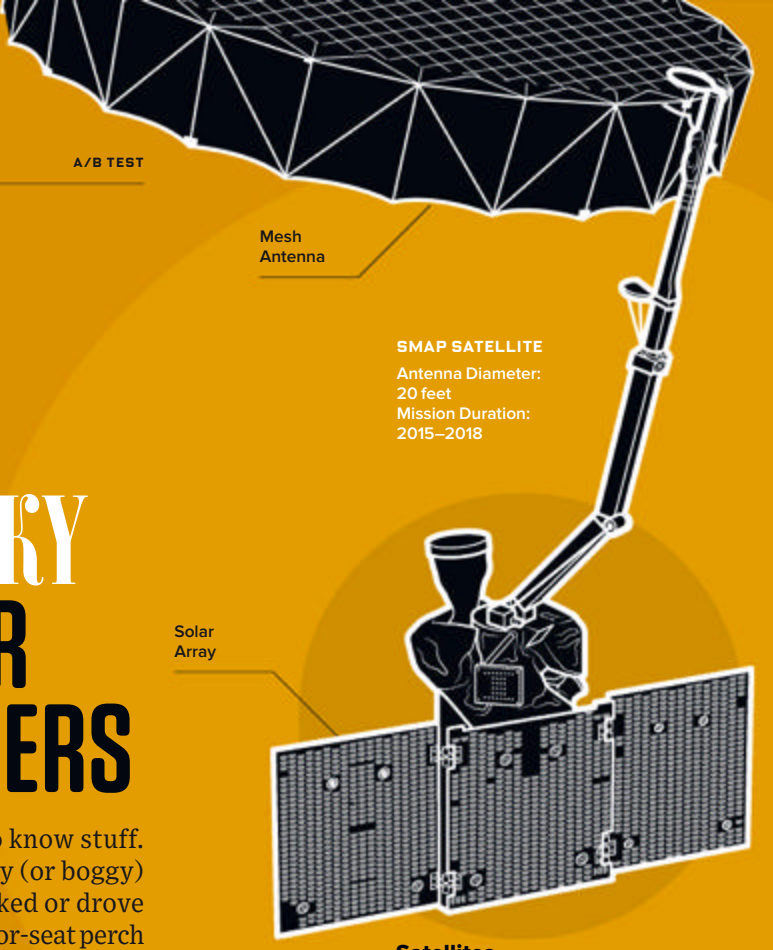
How it works
A plastic fingerboard is strung with cow-gut strings. The bridge has optical sensors; the wooden bow has pressure sensors.
What it does
Helps cellist and neuroscientist Melanie Segado study how musicians use aural feedback to correct intonation.

OH, THE COLORS YOU'LL SEE!

Check your pockets for wockets, because Dr. Seuss is back! This July a long-lost Seuss book hits the shelves, based on a previously unpublished manuscript: *What Pet Should I Get?* How familiar are you with cats, hats, foxes, and socks? **Each of these circles represents the color distribution of a single book cover.** Identify each one from its distinctively Seussian scheme. —SETH KADISH



Answers: (1) *The Cat in the Hat*, (2) *Green Eggs and Ham*, (3) *Yertle the Turtle and Other Stories*, (4) *Oh, the Thinks You Can Think!* (5) *There's a Wocket in My Pocket!* (6) *The Lorax*



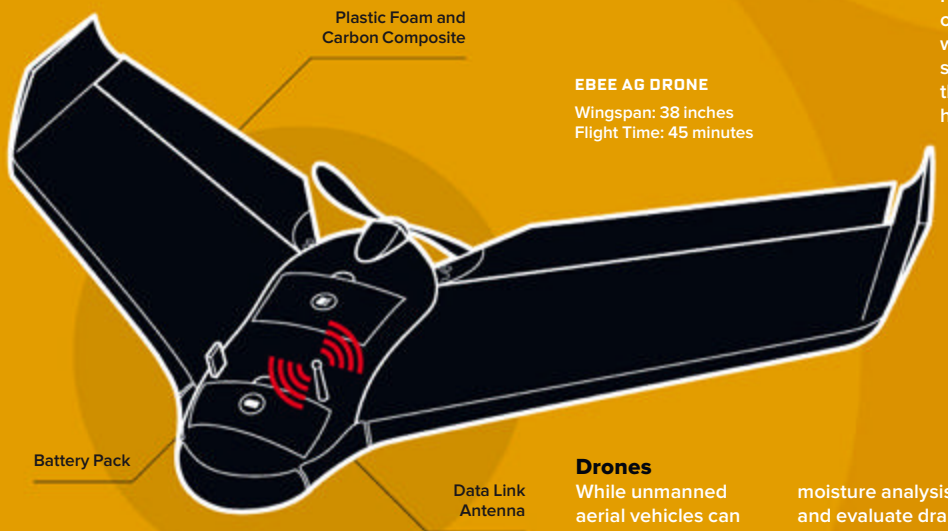
SMAP SATELLITE
Antenna Diameter: 20 feet
Mission Duration: 2015–2018

EYES IN THE SKY
TWO TOOLS FOR MODERN FARMERS

FARMERS WHO WANT to grow stuff need to know stuff. How rocky is their land? Where are the dry (or boggy) patches? Historically, of course, they walked or drove through the fields, using eyeballs and a tractor-seat perch to scan for problems. Today they can take a 2 million–foot view with the help of a satellite, or cruise closer to the ground with a drone. Here's how those two crop watchers compare. —VICTORIA TANG

Satellites

Birds in the exosphere currently gather info for irrigation management by large-scale farms. But while satellites orbit constantly, they only ping back data periodically. NASA's new SMAP orbiter takes regular water content measurements too, and the public will soon have free access to the info. (Commercial satellite-imagery companies will also watch your wheat in exchange for a little dough.) For SMAP shots, each pixel is equivalent to a square plot about 6 miles on a side; a commercial provider can offer squares smaller than 17 feet per side.



EBEE AG DRONE
Wingspan: 38 inches
Flight Time: 45 minutes

Drones

While unmanned aerial vehicles can zoom waaaaay in on arable land (and won't be blinded by clouds), they can cover only so many acres on a single battery charge. But during that short flight, drones can collect a bounty of measurements. They can use a near-infrared sensor to perform moisture analysis and evaluate drainage. An RGB sensor can count plants; yet another can track how mature they are. The data is pricey but very granular: In images from a drone like this SenseFly eBee Ag, each pixel represents a 2-centimeter square.

25K

COST OF THE EBEE AG DRONE (IN DOLLARS)

BROWN BIRD DESIGN


YOU MAY BE OUTNUMBERED,
BUT NEVER OUTSMARTED.



The completely redesigned 2015 Edge is here and ready for almost anything, with available features like a front 180-degree camera, enhanced active park assist and Lane-Keeping System. It's comforting to know you have a few surprises of your own. Go to ford.com to find out more.



BE UNSTOPPABLE

Ford

Go Further



VOLVO'S LOUNGE ACT

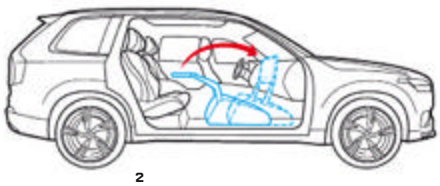
To cater to the ultra-high-end market, the Swedish car company made an unexpected move: It deleted some seats.

Riding shotgun has been a fine automotive tradition since the turn of the 20th century. Like the stagecoach before it, nearly every car produced has had two front seats—or at least space for two. Now an unlikely maverick, Volvo, is deleting that passenger perch.

The target for this shotgunless horseless carriage: China, where the luxury sector is booming and chauffeurs are standard equipment. That makes the backseat the place to be. Plushing out the rear seats is common these days. Maybe too common, if you know what we mean. So Volvo built the Lounge Console Concept SUV. Based on its XC90, this modern-day palanquin ditches not only the production model's third row but also the front passenger seat. Spanning that newly open space is a reclining massage seat, acres of legroom, and a combination ottoman-TV-work table-storage unit. Evidently it's not enough to be driven around by a minion; you also want to put your pampered, stinky feet right next to them.

At first glance (particularly for Americans), it seems absurd to remove the front seat, but for those folks with *Downton Abbey*–scale aspirations, it actually makes (some) sense. Volvo might never put the Lounge Console into production, but for now the XC90 Excellence edition, with no third row, four seats, and tons of rear legroom, will be available to titans of industry later this year. Yell up to Jeeves to go once more round the park while you sit in the way back—which conveniently doubles as the wall against which your ass goes when the revolution comes.
—*Jordan Golson*

1



2



1. Volvo's Lounge Console ditches the passenger seat for an articulating desk/screen.

2. Your mobile throne room includes a 17-inch TV, plush leg rest, and a niche for your rival-stomping shoes.

ILLUSTRATION BY JASON LEE

INNOVATION DOESN'T MAKE SENSE TO EVERYONE. WE'VE ALWAYS BEEN COOL WITH THAT.

WHEN WE STARTED, NO ONE EXPECTED TEQUILA TO COME IN AN ARTISANAL BOTTLE. BUT THEY DIDN'T EXPECT THE WORLD'S FINEST TEQUILA EITHER.

IT DOESN'T HAVE TO MAKE SENSE TO BE PERFECT.



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BACK TO CAMP
A *WET HOT* REUNION

BETWEEN HIGH CAMP AND LOW CAMP, there's summer camp. And in July, Netflix is rewarding fans of comedy crew The State's 2001 cult film, *Wet Hot American Summer*, with an eight-episode reunion series that adds to the movie's already-giant ensemble with a panoply of boldface names. *Wet Hot American Summer: First Day of Camp* rewinds viewers to Camp Firewood in the summer of 1981—which, yes, means that the original cast of alt-comedy luminaries and stars on the rise are yet another decade too old to play teens. And in the intervening years they've become astonishingly accomplished—so much so that it's hard to tell whether the alumni or the newcomers are bigger stars. Grab your bug juice and take a seat for the most overloaded talent show in the history of summer camp. —K. M. MCFARLAND

SENIOR CLASS



Elizabeth Banks
(Lindsay)
Roles after *Wet Hot*:
Scrubs, The Hunger Games, 30 Rock, Pitch Perfect



H. Jon Benjamin
(Can of Vegetables)
Roles after *Wet Hot*:
Archer, Bob's Burgers



Bradley Cooper
(Ben)
Roles after Wet Hot:
The Hangover, Silver Linings Playbook, American Sniper



Janeane Garofalo
(Beth)
Roles after *Wet Hot*:
The West Wing, Ratatouille, 24

'81



Christopher Meloni
(Gene)
Roles after *Wet Hot*:
Law & Order: SVU



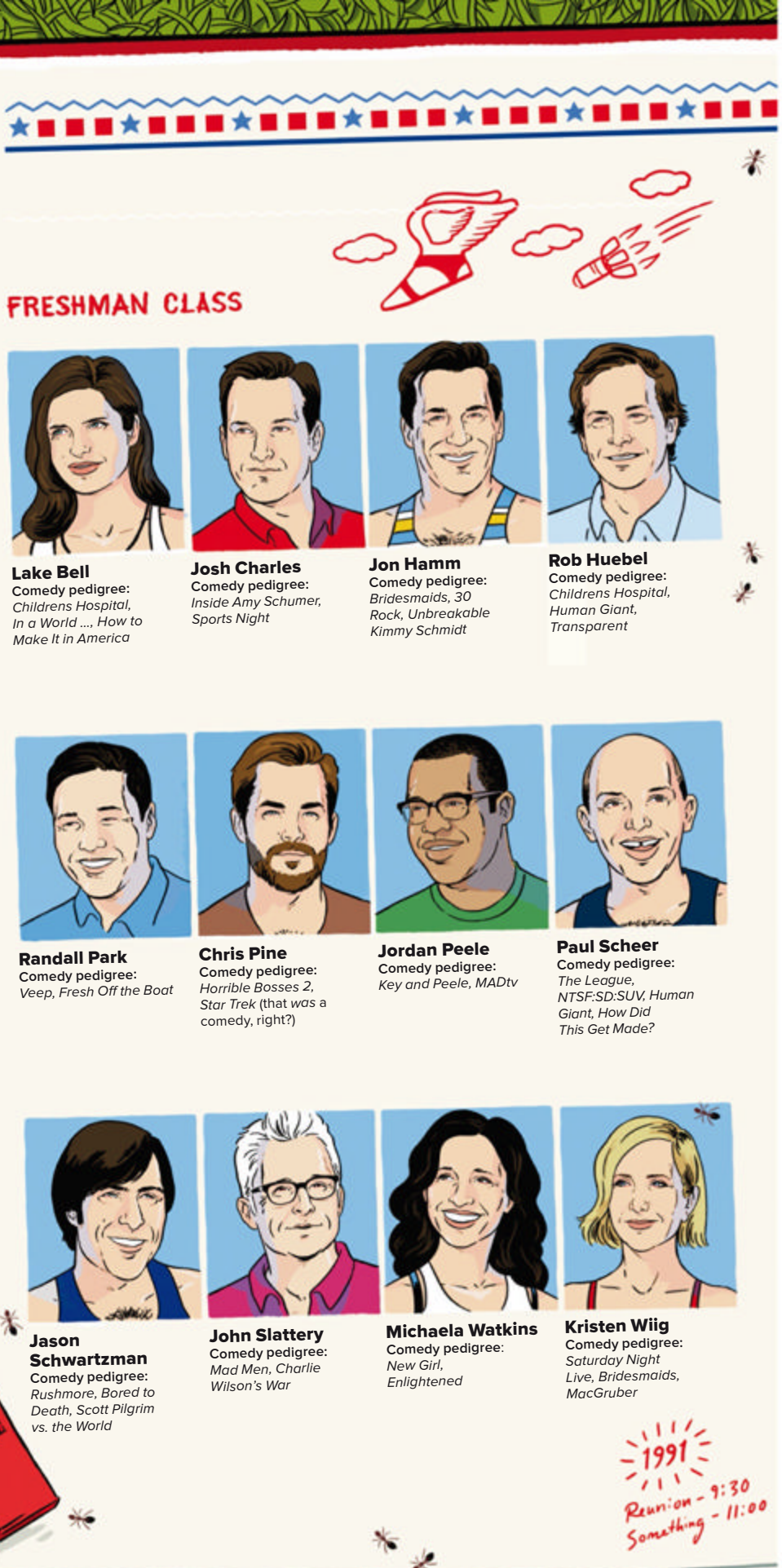
David Hyde Pierce
(Professor Henry Newman)
Roles after *Wet Hot*:
The Good Wife, Spamalot



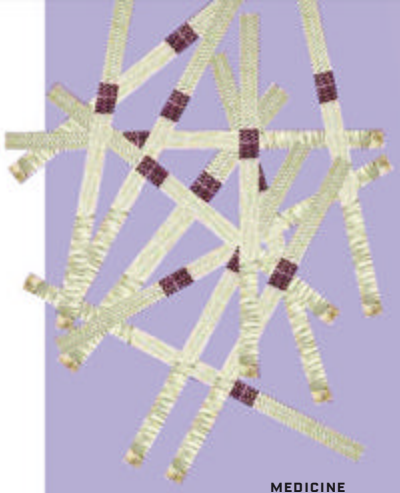
Amy Poehler
(Susie)
Roles after *Wet Hot*:
Saturday Night Live, Parks and Recreation, Golden Globes cohost



Paul Rudd
(Andy)
Roles after *Wet Hot*:
Anchorman, Knocked Up, Role Models, Ant-Man



KYLE HILTON



COURTESY OF ACHIRA LABS (SENSORS)

MEDICINE

SPIN IT UP
A BETTER TEST MADE OF SILK

Indian silk: great for scarves, saris, and now ... diagnostic sensors. That's the idea behind a biotech startup in Bangalore, and it's not as lavish as it sounds. In India, where access to affordable, quality health care is limited, doctors and patients rely on quick, low-cost methods to detect and monitor disease. Simple test strips, for instance, can identify everything from rotavirus infections to blood type. So far, plastic has been one of the go-to substrates for these types of tools, since it's cheap and easy to manufacture. But at Achira Labs, researchers are spinning diagnostic sensors out of silk. Not only does the material work better than plastic—threads can more easily direct the flow of fluids—it's actually a far thriftier option in a country rich in textiles: Silk strips are about one-third the cost of commercial testing kits, which might go for $10. "We source almost everything locally—the fabric, the looms, and the weavers," says Dhananjaya Dendukuri, Achira's cofounder and CEO. New products, including a diabetes test strip to help patients manage their blood glucose, will ship this fall once they're officially approved—a smooth solution to a global problem. —SHRUTI RAVINDRAN



SANTA FE AVERAGES OVER **300 SUNNY DAYS** PER YEAR—MORE THAN MIAMI // THE CITY'S PALACE OF THE GOVERNORS, BUILT IN **1610**, IS THE OLDEST ACTIVE GOVERNMENT BUILDING IN THE UNITED STATES // ARTISTS MAKE UP **3.4 PERCENT** OF SANTA FE'S LABOR FORCE



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WIRED CITIES

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SOUTH BY SOUTHWESTEROS



"Santa Fe is green chiles and sopapillas and breakfast burritos. It's glorious sunsets and long, lingering dusks—with no mosquitoes."

—George R. R. Martin, author of *A Song of Ice and Fire* and owner of Jean Cocteau Cinema

OTHERWORLDLY SUNSETS and quietude have long drawn daydreamers, celebrities, and scientists to Santa Fe. Those same qualities have also branded the nation's oldest capital an idyllic tourist trap. But change is coming, led by mayor Javier Gonzales, who last year promised to spur the "nighttime economy." Nowadays, downtown stays open for the nocturnal crowd. And July is high time to witness the City Different's transformation. Art Santa Fe and the International Folk Art Market, the area's most vaunted exhibitions, attract swarms of attendees, while Santa Fe Bandstand features an eclectic mix of concerts. And for those who stay up till dawn: hot-off-the-griddle breakfast burritos. —CAMERON BIRD



See

Catch a movie at **Jean Cocteau Cinema**, a majestic single-screen art house—opened in 1976 and revived in 2013 by little-known local novelist and fisherman-hat aficionado George R. R. Martin. **Skylight**, Santa Fe's newest music venue, hosts punk legends like X and indie darlings like Of Montreal. If you're itching for some history (ahem, dystopian history), drive 45 minutes to the **Los Alamos National Laboratory**, site of the atomic Manhattan Project.



Do

Once a bustling train depot, the downtown **Railyard** was recently reborn as a 50-acre district lined with open-air markets and art galleries. Take a hike up **Atalaya Mountain**, which rises 9,000 feet above sea level and provides a God's-eye view of the Rio Grande Valley below (and smells of juniper, ponderosa pine, and Douglas fir).



Eat

For a Southwest comfort-food twist, try a cup of the green chile beef stew or a banana leaf tamale at **Tune-Up Café**. After wandering through **Old Town**, refuel at **Bangbite**, a burger truck whose chef—Enrique Guerrero, formerly of Napa Valley's French Laundry—brings serious culinary cred. Trent Edwards, the owner of **Duel Brewing**, names his Belgian ales after Renaissance painters like Grünewald and the works of French novelists like Proust. (Make sure to try a beer-yeast waffle on the side.)

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THE GUIDE

PODCASTS

AFTER A FALSE START in the early 2000s, podcasting has exploded. More than 2.6 *billion* episodes were downloaded in 2014. Here's your user's manual, from hosting tips to must-subscribes.

1 Best Guest



Hrishikesh Hirway is the host of *Song Exploder*, a podcast that asks musicians to break down their most popular tunes and share the stories of how they were created. A musician himself, Hirway is great at getting his guests to reveal memorable specifics. Here, he shares his thoughts on what makes a great guest. *—Eric Steuer*

What does the ideal guest bring to the table?

A good memory and strong self-awareness. They can remember how and why they made creative decisions, and what those decisions say about who they are and what they're trying to evoke in others.

What do you do when a guest just isn't very interesting?

I'll try to subtly find different ways to ask the same question until I get a good answer. I also edit the hell out of my episodes. My interviews usually last at least an hour, but only the best eight to 10 minutes end up in the episode.

Have you had a dream-come-true guest?

I was thrilled when Phil Elverum of the Microphones and Mount Eerie told me he had been secretly hoping to be a guest.

What's been your favorite experience with a guest?

John Roderick was the easiest interview ever, because he's a gifted raconteur: He regularly speaks extemporaneously for his own podcast, *Roderick's Rendezvous*. And with "The Commander Thinks Aloud," the subject of the episode, he'd made a song that was sonically interesting as well as incredibly moving, both lyrically and musically.

2 Behind the Scenes

Phoebe Judge, host of Radiotopia's *Criminal*, opens up about one of the crime show's most captivating episodes.

We always have our eyes open, and we came across the story of Tommy Wall in the news. He'd been falsely accused of child molestation. It was only a couple of months after he was released from jail and cleared of all charges when his lawyer put us in touch. I thought he'd have his guard up—he'd been screwed by the press—but he let us ask incredibly personal questions. ¶ The guy had lost his house, so we were in one that a friend helped him find while he was in jail. It had very few of his personal things; most of them were still packed away. ¶ With so many of these interviews, I never see the person I'm talking to. To sit next to this guy in his house, to see his body that had lost so much weight since he was in jail, to see that he hadn't been outside in the sun—and to see him cry when someone sends him a text message that they're thinking of him—is pretty important. *—As told to K. M. McFarland*



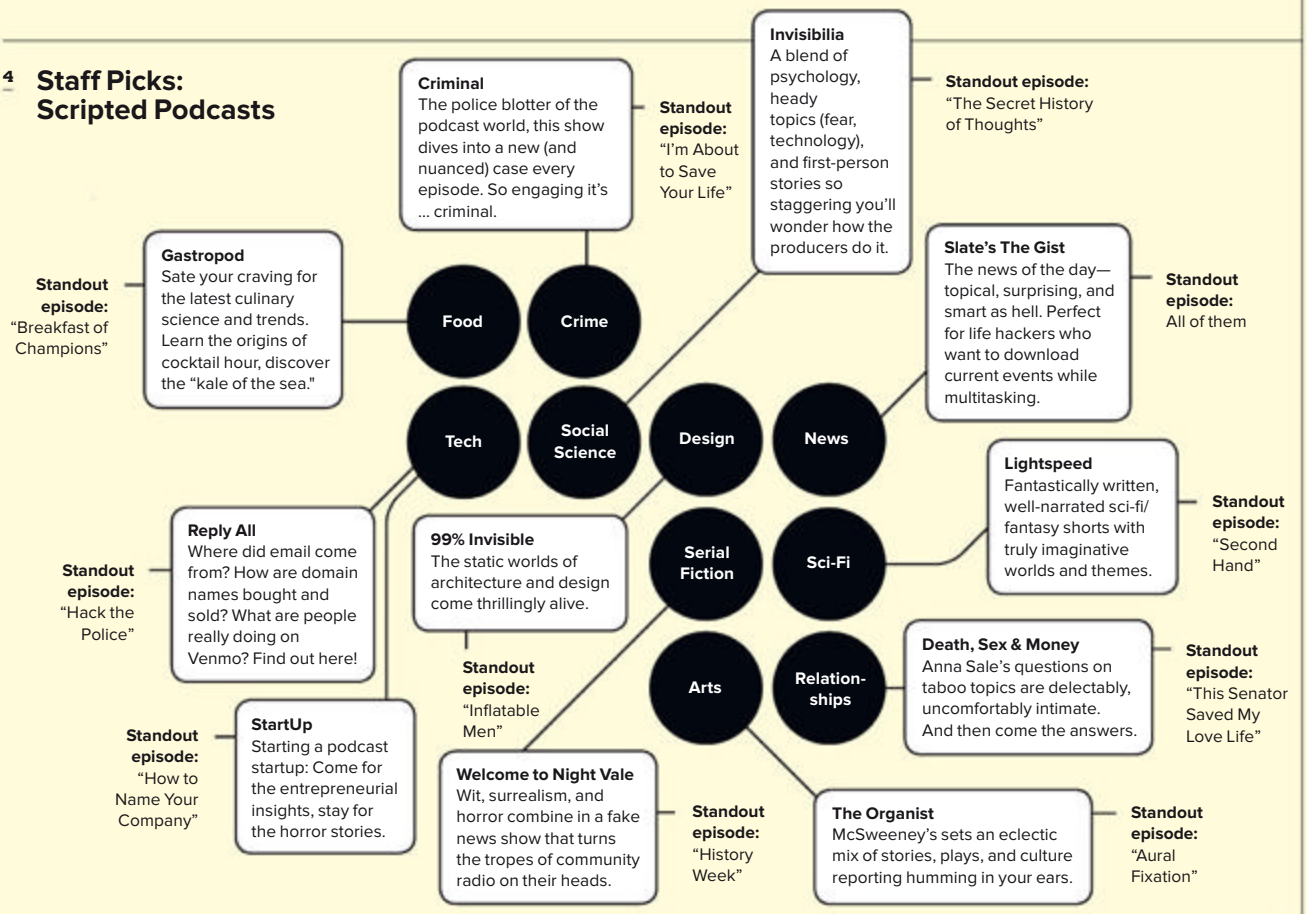


3 Host With the Most

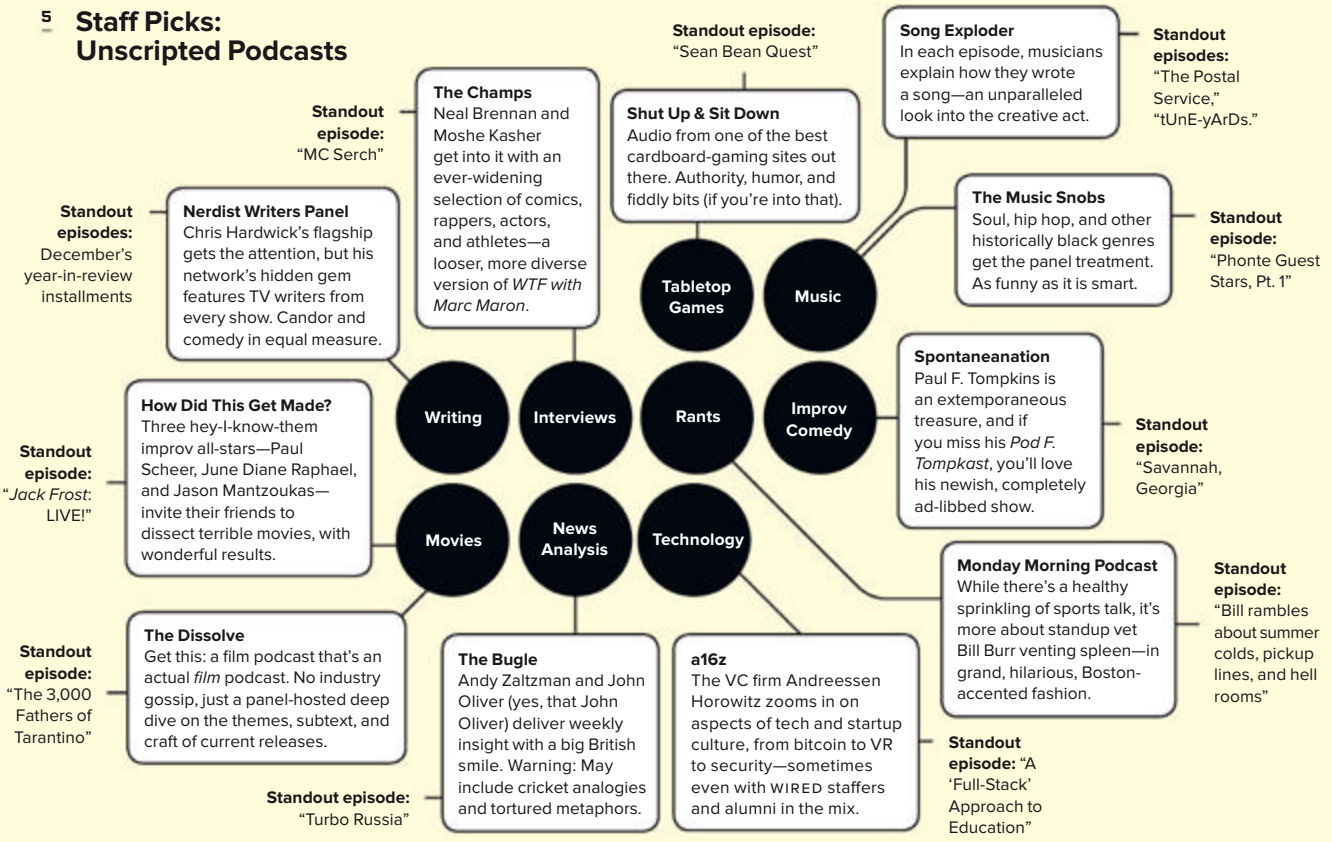
Actress, comedian, and *Pop My Culture* cohost **Vanessa Ragland** knows both sides of the mic. We asked her to break down the qualities of a good podcast host.

I love it when a host has done their homework and is familiar with my work. I appreciate it when they're organized and focused and really steer the conversation. It stresses me out if they don't have a lot of talking points or are hesitant during pauses. My favorite experiences as a guest have been on comedian Elizabeth Laime's shows—she used to do a podcast called *Totally Laime* and now hosts *Totally Mommy*. She introduces each episode's guest as her cohost, which really sets a nice tone. She's a great talker and a great listener, and I always forget there's a mic about three seconds in. I've had some of the breeziest conversations with her, and I've also cried my eyes out. *—As told to Eric Steuer*

4 Staff Picks: Scripted Podcasts



5 Staff Picks: Unscripted Podcasts



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ELECTRIC WORD

Throw Me a Buck for God's Sake!

THE ARGUMENT

Digital tipping rescued baristas. Now it can do the same for artists.

BY ERIC STEUER

I HAVE A SOFT SPOT for old pop-rap, and on a surprisingly regular basis I fire up Spotify with the sole purpose of listening to Skee-Lo's one and only hit, the 1995 paean to the little guy "I Wish." It really holds up: great beat, clever concept, funny lyrics, catchy hook. Still a jam, 20 years later. At home the other night, it came on as part of my "Hip Hop You Can Play in Front of Your Kids" dinner playlist. "I wonder where this dude is now," I said to my wife. "I'd love to throw him a couple of bucks for having made something so fun back in the day." ¶ Problem is, I can't. I could go to iTunes or Amazon and download the track, hoping that some small fraction of my small payment would find its way around the array of suits and stakeholders to wind up in Skee-Lo's pocket. But that feels like a pretty inefficient way to show my support. (Also, it's 2015. MP3s? Yuck.) At the same time, I'm well aware that streaming a song isn't a meaningful way to financially support its creator.



For artists—even one-hit wonders like Skee-Lo—the rise of digital tipping could give their hard work a long tail.

Eric Steuer (*@ericsteuer*) **wrote** about the closure of escort-review site RedBook in issue 23.03.

Don't get me wrong—I like Spotify. And Beats and Rdio and the other on-demand music services I use. But the reality is that most artists are paid next to nothing per play. Listeners like me have transitioned from buying music to using streaming services because they're easy and inexpensive. We love the access and the immediacy. But I suspect that even the most enthusiastic Spotify user shares at least a vague sense that getting so much music for so little (or for free, if they're willing to put up with the ads) is an unfair trade. And while I don't believe that these services are to blame for the record industry's current financial woes, it's pretty clear that they haven't gone too far out of their way to help artists either.

Many music fans want to be able to do something tangible that would help support the musicians they love—there's just no easy, effective way for this to happen. But it wouldn't be hard. Streaming music services should take a cue from mobile payment systems like Square and let users offer tips.

If you've been to a coffee shop or restaurant in the past few years—or if you've used an on-demand-service app like Lyft or Postmates—you've noticed how easy Square and its ilk have made it to tip workers: Just select the percentage and you're done. From 2013 to 2014, tipping on Square increased in frequency by 35 percent; tips to New York City cabdrivers have more than doubled since taxi companies started making it easier to tip digitally. Plenty of writers have thus done plenty of hand-wringing about how tipping has been made too easy, with some going so far as to call for abolishing it altogether in a crusade against "tip creep." One thing's for sure: In an opt-out scenario like this, people are far more likely to throw a little extra dough around.

So what happens when you apply that model to artists? Well, we might have a way to do what most reasonable people wrote off years ago—make being an Internet-era musician a financially worthwhile endeavor.

To be clear, this is totally different from the Internet tip jars you used to see languishing in the footers of musicians' personal websites 15 years ago. Remember that magical time? The Napster free-for-all was on the rise, and the market for physical media was beginning its long, steady collapse; in our naïveté, we thought that artists might weather the storm if enough fans stopped by to say hi and drop off a few bucks via PayPal. That didn't work,

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because the process was cumbersome: First, go to an artist's site; second ... nope, sorry, two steps is too many.

We're a culture of centralized platforms now, and turning payment into a side quest isn't exactly a recipe for success. You know what is, though? Leveraging the infrastructure of the services that we're already using and automatically paying for with monthly subscription fees. Imagine a button on your favorite band's Spotify profile that allowed you to send them a buck while you're listening to their song. Spotify already has your credit card info; more critically, its platforms already enable musicians to set up verified profiles. By allowing artists to link their profiles to digital payment accounts, and by employing some UI magic, the streaming services could make tipping artists a seamless, nearly trivial process.

Obviously, other online media outlets could apply this approach to help compensate other types of creators too. How many times have you watched an amazing documentary and wished that you could help support the almost certainly underpaid filmmaker who spent years researching, interviewing, shooting, and editing it? More than once, I've swiped through the last page of an incredible novel on my Kindle and wished I could give the author a little something extra. Netflix, Amazon: Make this so.

Recent news that Facebook will soon begin to facilitate payments means that the company could build a similar system to make it possible for people to tip journalists, video makers, photographers, and anyone else whose work is published to the social network. (Imagine: a positive, productive way to use Facebook!)

In the age of free, plenty of people won't be willing to pony up—probably even a vast majority. But with passionate fans, an approach like this could substantially impact the financial lives of many artists. Look at Patreon. Since earlier this year, singer-songwriter Amanda Palmer has used the crowdfunding site to get more than 4,500 fans to collectively pledge $31,000 for every



RETRO VIDEOGAMES ARE NO JOKE!

Remember when *Wreck-It Ralph* came out and we were overjoyed to see '80s videogame characters on the big screen? Well, it's not 2012 anymore; the new Adam Sandler vehicle, *Pixels*, makes me regret my Galaga tattoo! The movie is about space invaders who take the form of ... Space Invaders. And Pac-Man and Donkey Kong and other arcade icons. For starters, this concept was ripped off from a *Futurama* episode. But what really gets my Gorf is how *Pixels* crapitalizes on the popularity of the retro 8-bit aesthetic, reducing it to a shallow hipster affectation. Mario isn't kitsch, he's an avatar of hope for everyone who was terrified of turtles and mushrooms as a child! (Not that I would, uh, know anything about that.) Those games were more than cheesy graphics and bleep-boink sounds—they were feats of innovation, creating spectacles that were without precedent. It's time to declare Game Over on arcade punch lines; let's lionize the beautiful minds behind the pixels. If you thought *The Imitation Game* was an engrossing look at Alan Turing's life, you'll go nuts for *Allan Alcorn: The Pong Father*, *Just for Qix*, and *The War of the Wizards of the Wizard of Wor*!



ZOHAR LAZAR

new song, webcomic, podcast, or video. Doubly interesting is that the fans are doing it without expecting anything in return except the art. This isn't Kickstarter-style backing, where people contribute money in exchange for stuff like exclusive vinyl records and T-shirts. With Palmer's Patreon campaign, they don't get much more than the satisfaction of knowing that they're helping someone whose work they like and respect continue to lead a creative life.

The trick will be figuring out how to make fan transactions a reality for all artists—not just those with audiences as large, rabid, and motivated as Palmer's. By enabling tipping inside the platforms that we already use to consume creativity, streaming services could make it possible for fans to easily support any artist they love. If this happens, you can bet I'll be shelling out like crazy to all the old-school rappers on my dinner music collection. They just have to get in line behind Skee-Lo.

SPACE FOR THE UNKNOWN

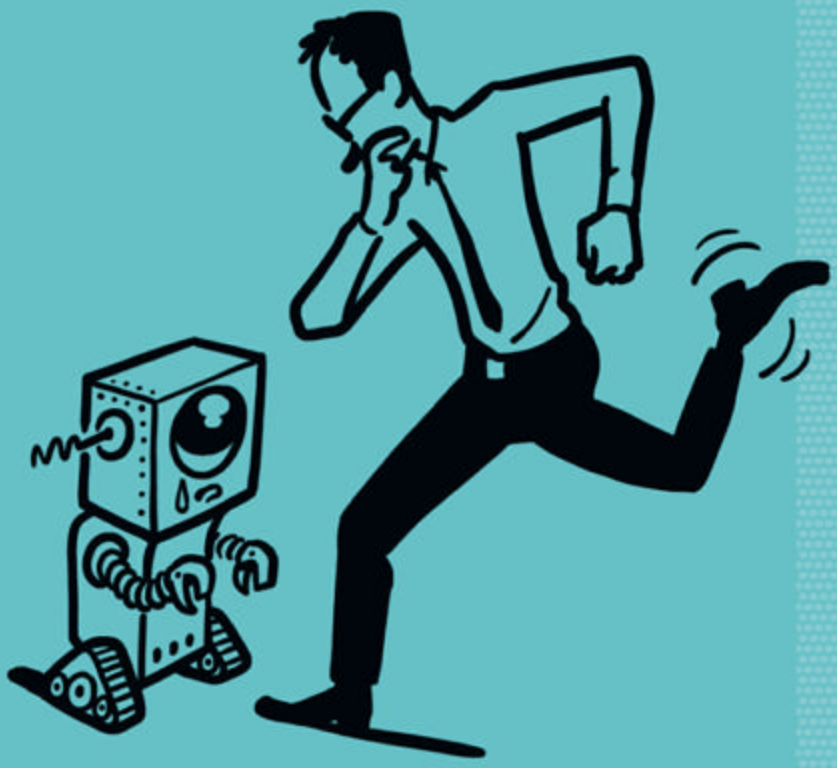
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Q:

Is it OK to kick a robot?

BY JON MOOALLEM

A: Robots: They're just like us! Just look at them go! Exploring the ocean floor! Assembling cars! Detonating explosive devices! Vacuuming the living room! Performing surgery! I read about one, called OSHbot, that works at a hardware store in San Jose, greeting customers in five languages and leading them down the aisle toward just the right-size wing nut. ¶ And yet they're also nothing like us. They are sleek and deft and their work ethic is phenomenal. They never hesitate or stutter or smell bad, or register ambivalence, or come in hungover or drowning in woe. They just get the job done, typically the same very specific job, over and over and over again. And thank God they do, because that labor frees up us humans to do what we do best and what the robots cannot do—what, in fact, you seem to be doing right now: to feel *feelings*, and to feel those feelings colliding against logic in ways that aren't easily reconcilable. Because you seem to know, as I do, that logically speaking it's *totally* OK to kick a robot; robots have no emotions, no pain receptors, no moral purchase in a world dominated by us bags of organic matter. But you also know that we—unlike robots—do not run solely on logic.

A couple of years ago, for example, a research specialist named Kate Darling at the prestigious MIT Media Lab ran a workshop in Switzerland with a collaborator, Hannes Gassert. They divided people into groups, gave each group a little robotic dinosaur called a Pleo, and asked them to dress their bots up with construction paper and pipe cleaners. Then they held a robo-saurus fashion show. Oh, how precious it was! People grew attached to their Pleos quite quickly. Everyone loved pampering and personalizing their Pleo, and making their Pleo look its best.

After the fashion show, Darling and Gassert sent everyone out for a coffee break. When the participants came back, they were told their Pleos had been misbehaving and needed to be punished. The roomful of Pleo-lovers recoiled. A few people wagged fingers at the Pleos and sort of scolded them in a cutesy way. "But we were like, no," Darling tells me. "Corporal punishment." They said you need to beat the Pleos; kick the Pleos; hurt them, badly.

Pleos, it should be mentioned, are downright adorable and will struggle or whimper or hang their big-eyed dinosaur heads glumly when neglected or harmed. For a long while, no one in the room could bring themselves to lay a hand on their Pleo. Gradually, Darling says, "a few people would just tap the Pleos feebly, hoping that would satisfy us." But it did not satisfy them. It did not satisfy them at all. And so they escalated the situation, announcing they were going to kill all the Pleos themselves—but first offering each group a chance to save its beloved Pleo by murdering another group's. Then Darling and Gassert took out a hatchet.

Things got intense. Some people giggled nervously. Finally a young man picked up the hatchet and stoically decapitated one of the Pleos while everyone watched. "There was a moment of silence after he struck down the struggling Pleo," Darling says: a reflective lull. ("I don't know if you could do this workshop with kids, ethically," she adds.)

So what is the answer? Is it OK to kick a robot? "My answer so far is: It depends," Darling says. Her work is part of a growing body

CHRISTOPH NIEMANN

of research that shows how seamlessly we transfer an apparently hardwired human empathy for abused or mistreated living things onto abused or mistreated anthropomorphic robots—even if, intellectually, we know we don't have to feel sorry for that manufactured object. "The key question for me is: To what extent does it get muddled in our subconscious?" Darling says. Does kicking a robot desensitize a person to violence and suffering, so that they eventually feel free to go home and kick their dog too? Or does kicking a robot offer a harmless and satisfying outlet for aggressive behavior so that they *no longer* feel compelled to kick their dog?

If it's the former, robot-kicking is deplorable and dangerous. If it's the latter, robot-kicking is therapeutic and quite possibly a key ingredient in achieving world peace. But at this point, Darling says, we just don't know: "It can go either way." And we probably won't know for a while. After all, decades of research (and a whole lot of sanctimonious hand-wringing) haven't answered a fundamentally similar question about videogame violence. And that means, for the time being, it's up to each of us, individually, to figure out what kind of robot kicker we are and act accordingly.

So, what kind of robot kicker are you? Well, the fact that you'd even ask this question—that you're sensitive enough to find robot-kicking ethically dubious—assures me that you could kick a robot without that violence spilling over problematically into other dimensions of your life. But it also tells me that you wouldn't actually want to kick a robot. And neither would I.

What I'm saying here is, you're allowed to kick a robot. But don't.

Finally a young man picked up the hatchet and stoically decapitated one of the Pleos while everyone watched.

Q:

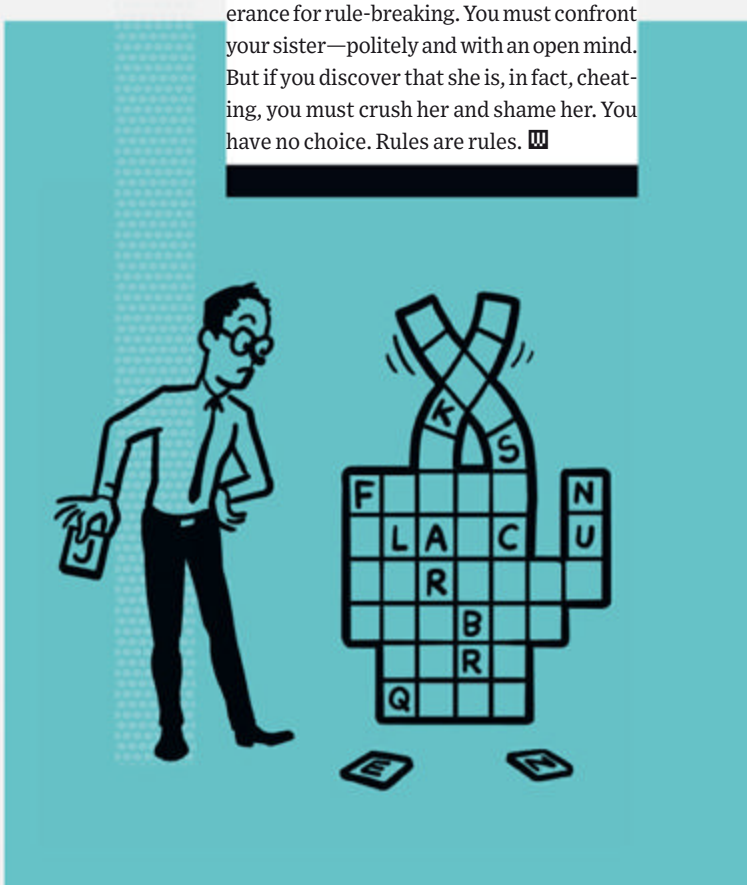
I think my sister cheats when she plays *Words With Friends*—should I approach her about this breach?

A: I don't like to preach, but I take rules very seriously. Rules bind us—not just as good-faith players of some peppy, digital Scrabble knockoff but as participants in moral society. And it's especially important to uphold the rules of digital spaces because, even after all these years, they can still sometimes feel like a fiercely lawless frontier of scammers, doxxers, hackers, and phonies. It's easy to peer into the ether and wonder, who are all these streams of texts and emoji and avatars, really? (As that famous *New Yorker* cartoon put it, "On the Internet, nobody knows you're a dog.") It's a mucky, mucky swamp out there; rules give us a small, firm plank to stand on, together.

Rules matter. But you know what else matters? Words. Words matter. Suppose after reading this you discover I've never actually played *Words With Friends* and have no idea what I'm talking about. You'd feel betrayed—largely, I think, because this column is called "Mr. Know-It-All," a title that advertises my expertise and authority and tells you you're in capable hands.

Similarly, I suspect there's a reason the game is called *Words With Friends*: because we need to be reassured; we need to feel that the game is unfolding on a cushion of trust and respect, even if the so-called Friends we are Wording With are actually far-flung total strangers we've discovered via algorithmic Smart Match. And so the game assures us, even before we begin playing, that we can have faith in the people we're playing with. They aren't secretly dogs. They are Friends.

The Friend *you're* playing with isn't just a friend. She's also your sister! (Unless it's not your sister and is secretly a dog. Are you sure it's not a dog?) The bond between you is big and powerful and real; what you're describing is bigger than Scrabble. And so, in this particular case, I can find absolutely zero sympathy and cannot countenance any tolerance for rule-breaking. You must confront your sister—politely and with an open mind. But if you discover that she is, in fact, cheating, you must crush her and shame her. You have no choice. Rules are rules.

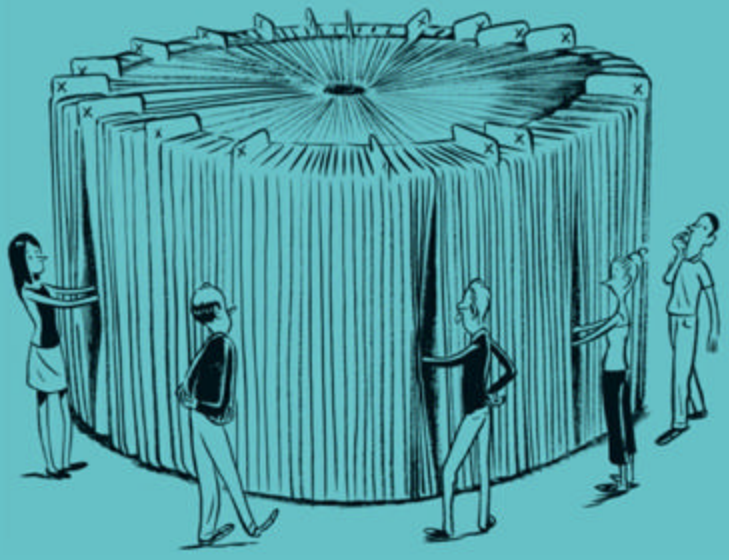


Desktop Nirvana

The browser wars are back. Thank goodness.

BY CLIVE THOMPSON

MY BROWSER IS A MESS. When I'm working on my laptop, I usually have about 40 tabs open at a time: a dozen Google Docs, Twitter, a couple of forums, oodles of other research pages. Pretty soon my work slows to a crawl because I can't refind the damn site I was just looking at. ¶ That's why I've become addicted to Vivaldi, an upstart browser launched in "technical preview" this year. Vivaldi has brilliant tab-management features, including a search box that lets you find an open tab by typing in keywords and a "tiling" view that lets you see several tabs side by side. I'd tried various Firefox and Chrome extensions to achieve this sort of tab nirvana before, but they were always clunky or crash-prone. Vivaldi, built with these goals specifically in mind, hums. "It's for power users," says Jon von Tetzchner, Vivaldi's founder. "We're building a browser for people who want to do more than just get into Facebook." ¶ Vivaldi isn't alone. The Russian firm Yandex is developing a new browser, and Microsoft is releasing one called Edge, which will eventually replace Internet Explorer. All told, this ferment has created a curious moment: The desktop browser is once again hot. ¶ At first glance, this makes no sense. Global growth in Internet usage is all mobile, right? So it seems counterproductive for any developer to cast their lot with the old-school, plodding, desktop browser.



ZOHAR LAZAR

We've got Chrome, Firefox, Safari, Internet Explorer. Isn't desktop web surfing solved?

It isn't. One problem with the modern pantheon of browsers, from von Tetzchner's perspective, is that they've become too mainstream and thus too cautious and conservative. They've focused on the vast majority of Internet users who, studies show, use only a handful of tabs at a time. This has for years left power users underserved. "I am salivating over Vivaldi," says one of my fellow enthusiasts, a private investigator. (Opera, founded in the '90s by von Tetzchner himself, was the lone browser that cultivated power users. But in 2011 he left the company and management killed off most of Opera's hardcore features.) While early adopters may be a minority, they drive innovation. Cater to them and you'll build things that occasionally electrify the mainstream too.

What's more, desktop browsing isn't as dead as you think. Sure, the number of mobile devices exceeds desktop ones—but "there's actually more browsing going on through desktops than all those mobile phones put together," says Roger Capriotti, a Microsoft marketing director who works on Edge. Desktops are where we get work done, and that work today is most often done in a browser. Indeed, Microsoft has found that Windows users spend more than 50 percent of their time in browsers. That's where cloud services usually live, after all.

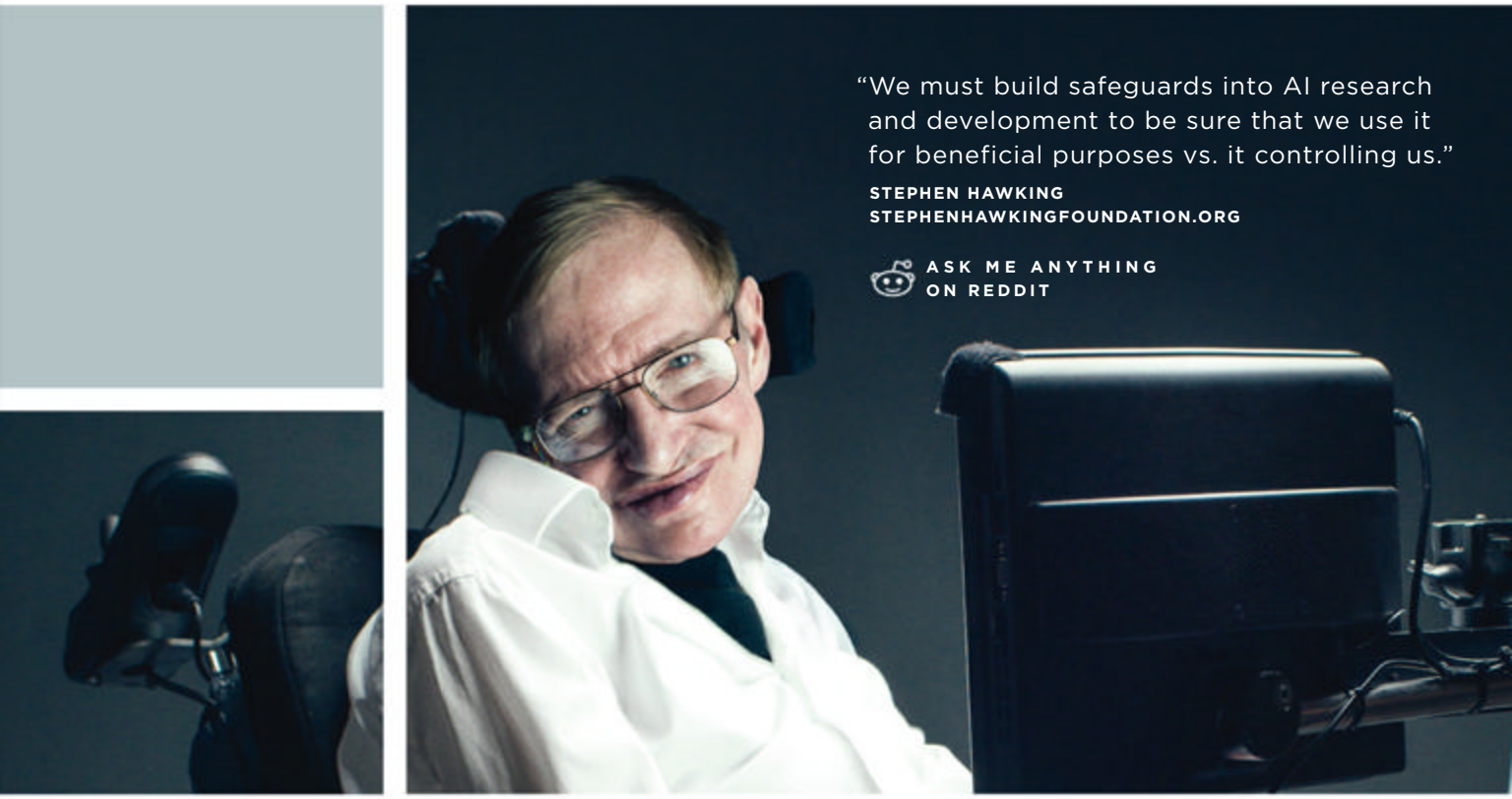
Which is precisely why we need a browser renaissance. These creaky old tools could adapt better to how we work today. Microsoft Edge and Vivaldi—having noticed the rise of screenshot culture—have features that let you snapshot and annotate a page. In Microsoft's case you can use a touchscreen to doodle on an image, then email the result, a feature that makes Edge seem hilariously fine-tuned for generating 4chan-style viral images. But hey: That is what people often do online now, even for work.

One can imagine even more audacious modifications. What about building in peer-to-peer apps? Back in 2009, an experimental version of Opera let you host a website, chat rooms, and file-sharing—all directly from your browser, with no corporate server in the middle. In a post-Snowden world, features like that would find plenty of fans. After years of lying fallow, the browser can once again bloom. W

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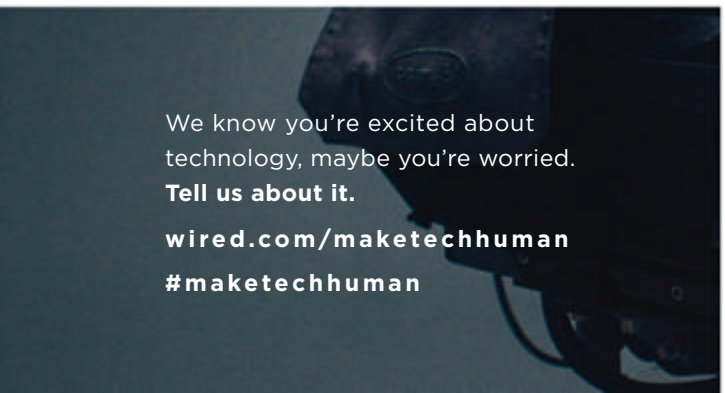
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NOKIA AND WIRED took the #maketechhuman conversation to iconic theoretical physicist Stephen Hawking. While advancements in artificial intelligence are poised to solve some of humankind's most difficult problems, Hawking cautions that the technology could spell the end of the human race if left unchecked. Hawking is an early adopter of communications technology—a primitive form of AI—but he fears the consequences of machines that will "supersede" humans. Along with tech luminaries Elon Musk and Bill Gates, Hawking signed an open letter earlier this year imploring researchers to balance the benefits of AI with the risks. The letter acknowledges that AI might one day help eradicate disease and poverty, but it also puts the onus on scientists at the forefront of this technology to keep the human factor front and center of their innovations.





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OUTDOORS CARVER C7 COMPLETE

FETISH STREET WAVE

NEXT TIME YOUR local surf break is stacked with windblown slop, ignore the Xbox and go bomb the 'hood. This retro-look board isn't just shaped like a wave rider, its components were designed to mimic the feel of a surfboard underfoot. Key to its fluidity is the spring-loaded front truck, with a dual-axis setup that's far more responsive than a classic skate truck. When riding waves, your back foot stays anchored over the fins while your front hoof pushes the nose around. The Carver lets you pump and weave in much the same way, all while keeping the front wheels grounded. The wheels are unique too: An hourglass shape delivers a large contact patch, providing extra grip for carving out deep turns. It's the next-closest thing to riding on water and the best way to get rad on lousy beach days. —MICHAEL CALORE

$215 and up

STEPHANIE GONOT & ADI GOODRICH (SET DESIGN)

HEAD-TO-HEAD ACE HARDWARE

Choosing the right stick depends on the player you already are—and the player you want to be. —NICK STOCKTON



Prince TeXtreme Tour 95

BEST FOR: Retro-minded players who like to hit hard and rally from the net

The carbon-fiber TeXtreme is firm enough to give you Agassi's power but soft enough to keep your elbows from screaming. The bottle-cap-sized sweet spot might frustrate at first, but soon you'll be smashing winners with laser-sight accuracy. A handle-heavy design affords wrist speed that'll leave your opponent dizzy.

$199

Wilson Burn 100S

BEST FOR: Hardcourt warriors who want fast action and more baseline muscle

The Burn's heat comes from its stiff carbon-fiber frame, which gives speedier swings extra power. But it's the racquet's spin-generating string setup that'll turn you into a baseline god and send your shots over the net in arching, Zeus-like bolts. The sweet spot is huge and springy; summon that otherworldly strength from anywhere.

$199

STEPHANIE GONOT & ADI GOODRICH (SET DESIGN)

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OUTDOORS

COUNCIL VELVICUT HUDSON BAY AX

BENCHMARK
A CUT ABOVE

The indispensable do-it-all tool of centuries past is still swinging. —JONATHON KEATS

IN THE WILDS of the American frontier, the camp ax was essential: Strong enough to fell an oak yet light enough to carry on your belt, it could be used to clear forests, build houses, kindle the hearth, and hunt game. John Pickett Council opened a forge on North Carolina's Lake Waccamaw in the early 1900s, and his standard of quality has been passed down through four generations of family management. The head of each Velvicut ax is drop-forged—a lump of steel is heated to 2,000 degrees Fahrenheit, pounded into shape under a falling hammer, tempered for hardness, then hand finished on a grinding wheel. The curved hickory handle is precision cut to follow the grain of the tree, maximizing strength and shock absorption. With the invention of the chain saw, most commercial ax production was relegated to foreign factories. Council, however, carried on with its frontier wisdom: All the wampum in the world won't fix an ax that breaks in the wilderness, and good luck hunting with a chain saw.

$137

STEPHANIE GONOT & ADI GOODRICH (SET DESIGN)



1

SOMA Fabrications Saga

This whip is no rocketship, and that's a good thing. It's built for cruising at a steady pace over long miles. The steel frame eats up bumps in the pavement, and the burly tubes have eyelets for front and rear racks, letting you load up your steed with multiple days' worth of supplies.

$1,399 and up

2

Ortlieb Bike-Packer Plus Panniers

These waterproof bags hold 42 liters of packables, keeping your delicates protected from the rain and mud. The adjustable mounting system ensures that your load attaches to the rack easily and stays there. Off the bike, a padded shoulder strap lets you schlep your gear in comfort.

$240

3

Mission Workshop Acre Organizer Bag

Flats and breakdowns happen—sometimes in the worst possible place. Keep your tools organized and accessible with this roll-up bag. Small zipper pockets hold your multitool and tire levers. Bigger pockets hold your patch kit, a pump, or a spare set of lights.

$24

4

Mophie Juice Pack Plus

Battery-intensive services like GPS will suck your phone dry as you navigate the boonies, and there aren't many electrical outlets along Route 168. When power nears zero, just flip a switch and the Mophie charges your phone back up to 100 percent. Plus it doubles as a protective case.

$120

5

7Mesh Resistance Jacket

Light is right when you're bike trekking. This 4-ounce jacket is as feathery as it is functional. The wind-blocking fabric cuts the chill on high mountain passes, and it breathes well, so you won't soak in your own sweat. It's water-resistant, keeping you dry in everything but a gusher.

$275

GEARHEAD
SADDLE UP

The best way to soak up the open road isn't behind the wheel, it's on a bike. —JAKOB SCHILLER



OUTDOORS

CAR CAMPING

GEARHEAD DRIVE TIME

Experiencing the great outdoors doesn't have to mean roughing it. Throw these goods in your trunk and gun it until all you see is trees. —DAVID PIERCE

1

Alite Hot Tamale Sleeping Bag

You want to stay snug in the wilderness, but a mummy bag can be a bit much, especially in summer. The Hot Tamale is light and roomy, and its rectangular shape lets you spread your limbs. A little pocket on top keeps your headlamp close. Camping with your partner? Zip two of them together.

$129

2

Snow Peak Medium Single-Action Table

Eating on a stump is for chumps. Nosh at this beautiful, durable bamboo table instead. It's spacious, but it folds down to lie flat in your trunk. Its carrying bag even doubles as a rain cover. Gather for dinner, stay for open-air drinks and cards.

$330

3

Rome Popcorn Popper

Fresh-popped popcorn is a stellar complement to some late-night stargazing. Plus, it's a cooking project anyone can handle. The lid on Rome's steel popper clamps down to keep lively kernels inside, and it makes a perfect bowl when the corn's ready.

$29

4

Kelty AirLift 4

This poleless pied-à-terre inflates with a pump, so it takes all of 60 seconds to set up. It's roomy enough for four, and there's a covered vestibule out front for your gear. When you're ready to head home just let the air out. All the fun of sleeping in the great outdoors, none of the hassle.

$440

5

Coleman FyreChampion HyperFlame 2-Burner Propane Stove

The powerful burners on this Coleman keep everything sizzling, even when the wind kicks up, and the included griddle attachments let you make gourmet omelets and pancakes simultaneously—no additional pans required.

$169

STEPHANIE GONOT & ADI GOODRICH (SET DESIGN)



ILLUSTRATION BY CARL DE TORRES.

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CASE STUDY
MEAT BOT

What you get when a team of Harvard engineers applies science to barbecue. —TIM MOYNIHAN

ATTENTION MEMPHIS and Kansas City! Cambridge, Massachusetts, is horning in on the BBQ game. A class of 16 Harvard engineering students just built the ultimate smoker, one that hits the goal set by their professor, Kevin "Kit" Parker at the Harvard School of Engineering and Applied Sciences, and Williams-Sonoma (each year, the course features a real-world client): Perfect brisket every time. ¶ A lieutenant colonel in the US Army Reserve, Parker has split his time between academia and tours in Afghanistan for the past 13 years. The smoker derives from his Tennessee roots. "I was at the BBQ Bowl in Memphis, looking at what the good ol' boys were smoking in," he says. "The biggest piles of junk. I was thinking, there's a science here. You could get the design down." ¶ After five months, 22 smoking sessions that started at 3 am, and 220 pounds of brisket, here's what the team cooked up. Let's hope the patent and licensing negotiations work out—we want this thing on our patio now.

Goal

Guided by Williams-Sonoma's wish list, the team set out to build a simple app-enabled smoker that delivered perfect results—no pitmaster pedigree required. Parker also wanted the smoker to meet Kansas City Barbeque Society rules: It had to use wood and charcoal fuel instead of gas or electricity.

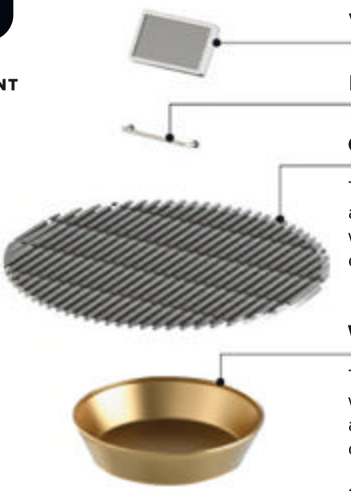
Material

The team chose thick ceramic. It retains and radiates heat well, allowing for ideal temperature control.



880

NUMBER OF MAN-HOURS PARKER'S STUDENTS SPENT SMOKING BRISKET



Viewing Port

Handle

Cooking Surface

The rack rides high, allowing smoke to wrap around the meat evenly.

Water Pan

The water pan helps with air circulation and moisture. Plus, it catches drippings.

Shape

The unique hyperboloid body mimics a nuclear plant's cooling tower. It's sturdy, pulls air upward like a cyclone, and spreads heat uniformly for an even smoke.

Lower Grate

THE HYPERBOLOID SHAPE MIMICS A NUCLEAR COOLING TOWER.



Fuel Chute

Many mass-produced smokers require users to remove the meat and grill to refuel. This chute allows for easy, non-disruptive access.



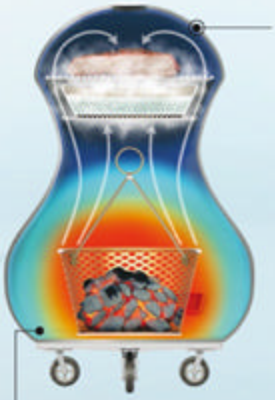
Fuel Basket

The basket makes adding and removing fuel easier, and allows for more uniform temperature control. No hot or cold spots!



Vent/Fan

Temperature Control



Built-in, precise temp control is a key innovation with this smoker, which uses a Raspberry Pi, fans, algorithms, and what's called a PID controller. The heat rises gradually until the air temp at the meat's surface hits 225 degrees, and the fans kick in to maintain that temperature for hours.



An app provides a real-time temperature readout and coaches you through the cook. It also has recipes for many smoked delicacies, and it auto-adjusts its controls for the weight and type of meat.



The Science of Smoke

Indirect heat cooks the brisket "slow and low," giving enzymes the optimal amount of time to turn tough collagen into melt-in-your-mouth gelatin. Wood adds flavor during the first few hours: Its lignins denature as it burns, releasing tasty smoky compounds. Too much heat can leave you with shoe leather, so controlling temperature is paramount. Flare-ups from drippings can cause an uneven cook; a water pan helps snag and neutralize falling fat.

100+

INCHES OF SNOW FELL IN BOSTON OVER THE TEAM'S WINTER OF OUTDOOR TESTING

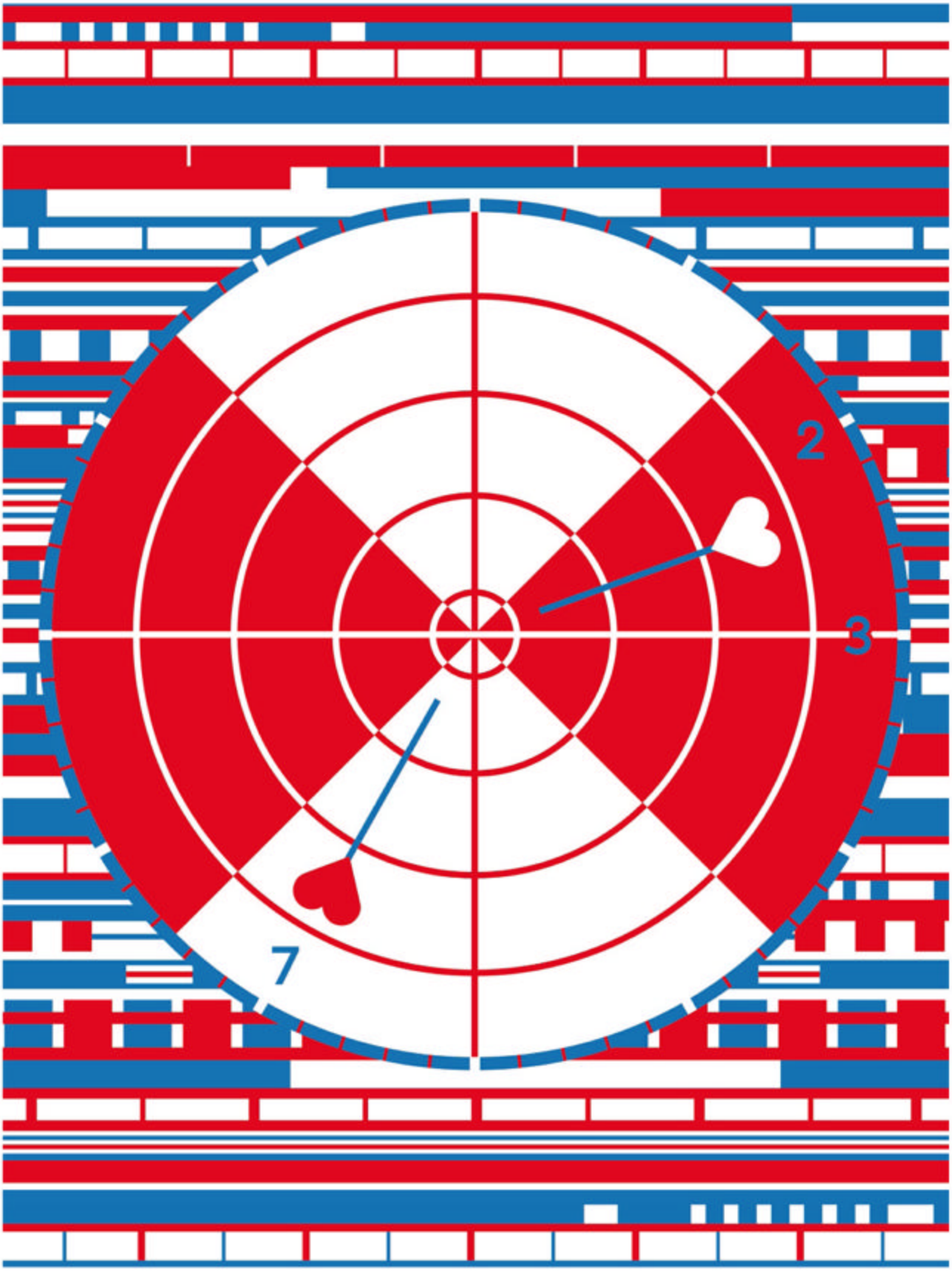
BRISKET IS SO TOUGH, ITS NAME COMES FROM THE OLD NORSE WORD FOR "CARTILAGE" // BRISKET IS SYNONYMOUS WITH TEXAS BBQ, BUT IT'S ALSO USED FOR CORNED BEEF AND PASTRAMI // JANUARY 14 IS NATIONAL HOT PASTRAMI SANDWICH DAY, MAY 16 IS NATIONAL BARBECUE DAY, AND MAY 28 IS NATIONAL BRISKET DAY // DROUGHTS AND A NEW ARBY'S SANDWICH HAVE CREATED NATIONAL PRICE HIKES AND SHORTAGES OF BRISKET



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6 DESK TOOLS THAT WILL MAKE YOU smile

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TELEPRESENCE Do's AND DON'Ts

P. 80

Why EVER NOTE ∞ IS BETTER THAN SEX

P. 79

All WORK & ALL Play

YOUR JOB AND YOUR LIFE HAVE MERGED. SO FINDING HAPPINESS TODAY MEANS FINDING CONTENTMENT AT WORK. WE'VE GOT SOME SIMPLE RULES FOR OPTIMIZING YOUR MIND, YOUR TOOLS, AND EVERYTHING ELSE SO YOU CAN (HOPEFULLY) ACHIEVE A STATE OF OCCUPATIONAL BLISS.

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WHY YOU SHOULD HAVE A WORK SPOUSE AND A CRUSH (AND HOW TO TELL THE DIFFERENCE)

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EMAIL IS D-E-A-D

learn to love SLACK, HIPCHAT & TRELLO

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ILLUSTRATIONS BY FELIX PETRUŠKA

by ART STREIBER

TYPOGRAPHY Crispin Finn

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How TO GET AHEAD zz WHILE SLEEPING ON THE JOB

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and much, much more →

THE JOY of WORK

BY RASHIDA Jones

LET'S BE HONEST:

Nobody can kill it all the time. I earnestly try to, but I just can't. I have an inkling that a lot of people feel this way. And I'm done pretending that technology is helping me streamline things. Sure, there are apps and calendars and shortcuts, and I'm connected to everyone and everything I could possibly need to make my life easier, to make myself happier. But ultimately I use my devices to waste time—and I get kind of addicted to wasting time. My computer and my phone sometimes feel like beautifully designed, entertaining handcuffs.

I'm partly to blame. I get distracted. I'm in the middle of an email—a work email—and suddenly I'm online looking at a Pinterest board of remodeled farmhouses or an article on Hillary 2016 or a video on Funny or Die, none of which is getting me any closer to replying to hundreds of unanswered emails or finishing a draft for a deadline that has come and gone. The tricky part is that everything is located in the same little place: Work, pleasure, distraction, misbehaving, responding, wasting time, buying, selling, dreaming, focusing ... all options live together, and I can float from one to another with no effort. It is truly amazing. I'm in awe. But it doesn't help me be productive.

So I'm figuring out some ways to deal. The first one seems to be self-discipline. My writing partner, Will McCormack, implements a no-phones-for-an-hour rule. It seems utterly ridiculous that two grown-ups wouldn't be able to stay away from their phones for just an hour, but there are many days when my phone owns me. And the rule helps. We tried to follow another rule that said no emailing each other or the people on our team at night. Nobody could handle it. Now we're just working on not immediately assuming that if you ignore an email you're a lazy jerk.

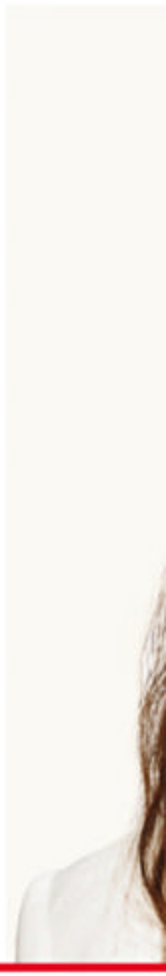


The other thing I'm working on is being willing to accept failure, whether it's a failure to get a TV show made or a failure to reply to a midnight email. Failure and risk are inherent parts of any real work. But there's a lot of fear of failing. (And yes, it is harder for women. Men's failures are not tied to their gender in the same way; that's just a truth.) Even though my instinct is to feel the shame associated with failure, I am finding ways to be OK with failing and being imperfect. I have to say, "Fuck it." I mean, the most creative, most successful people fail all the time. I'm working with Pixar—Will and I are cowriting the script for *Toy Story 4*—and there's definitely an attitude there of "fail fast, fail often." Our team does that. We cycle through ideas. Great ones and bad ones. Everybody has bad ideas. The most intelligent, most talented people in the world have bad ideas. That's a good thing to learn.

Besides working on the *Toy Story 4* script, I just finished the first season of a television show called *Angie Tribeca*, and I produced a documentary called *Hot Girls Wanted*—watch it on Netflix. So on a typical day, I'm just finishing a story meeting and there's a pile of notes, I get an email with even more notes, and I have my own notes and edits and suggestions. Then I'm getting a call for an interview I forgot I had. Plus I'm getting texts from people I actually love and care about. Plus my computer is crashing and I've lost the latest ver-

RASHIDA SAYS

"MY WRITING PARTNER IS MORE OF A MORNING PERSON, AND I'M MORE OF A NIGHT PERSON. BUT WE'VE LEARNED HOW TO FIND A SWEET SPOT, WHEN WE'RE BOTH WORKING AT OPTIMAL CREATIVITY TOGETHER. IT'S CALLED THE AFTERNOON."



Styling by Brad Goreski at Forward Artists; makeup by Tracey Levy at

sion of a scene I worked on for hours. And I have to change my flight on my Southwest app because now my meeting is running late. And then also maybe I forgot I'm having a couch delivered and they can't get into my house and nobody's answering the phone. So I have to reschedule a delivery and I'll be out of town for two weeks and on and on and on and on. It's relentless.

One thing does help. I try to remind myself that happiness is not the endgame. If your happiness depends on selling your company, snagging one perfect job, finishing the design for your perfect living room, you'll never actually achieve it. And now that work and



life have merged together, it's doubly important to remember that you deserve to be happy all the time. Luckily, there are techniques and tools that can help you achieve this total world domination—or at least a smooth day at the office. —AS TOLD TO SARAH FALLON

HAVE A HAPPIER DAY

WITH CHEMISTRY!

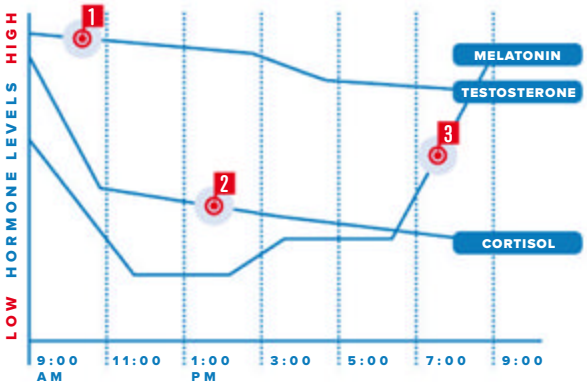


BY JAMES MCGIRK

Eyelids open; flowers blossom; tiny beaks tap cracks in eggshells; crops sprout; creatures stalk, slide, and wriggle from their burrows; teenage elk scrape hooves in the dust, lower antlers, and charge their competition. So: Did you—yes, *you*, clutching your fourth Keurig of the day and still feeling sluggish—really think you were immune to the effects of circadian rhythm, aka the clock cycle of practically *all living things*? Please. ¶ The master controllers of your internal chronometer are two tiny clusters of neurons called the suprachiasmatic nuclei, located behind your eyeballs in the hypothalamus. This area of the brain helps regulate the chemical factors that determine whether you feel droopy or perky. Here's how to synchronize your activities with your hormone levels.

WHEN TO DO WHAT

OPTIMIZE YOUR SCHEDULE



[1] Testosterone levels are high; time for nervy, jumpy activity: Free-associate. Blast emails. Pitch ideas. Crank it out. **[2]** Cortisol (stress hormone) levels continue to fall. Channel this convivial, ebullient energy into a meeting: You might find the cross talk less ranty and bizarre than in the morning. **[3]** This is a goofy, creative time, when melatonin seeps in and your brain begins to prep you for sleep. If you want to file things away in your long-term memory, do it now. This is a good time for deep thought and close study.

Forward Artists; hair by Anh Co Tran for Leonor Greyl at TraceyMattingly.com; prop styling by Shannon Amos at Amos Styles; blazer and pants: Derek Lam; top: Tory Burch; shoes: Bionda Castana

SECTION 1

SHARPEN your MIND



HAPPY EYES, HAPPY BRAIN

To combat the fatigue, blurry vision, and headaches you get from staring at your damn screen all day, try **F.LUX**. This free program gradually adjusts the colors on your display as night falls, so you're not blasting your brain with blue keep-you-awake light in the evening. For novelty value and a little temporary relief on some Macs, invert the colors: **CONTROL + OPTION + COMMAND + 8**. Ahhhhhhh. —RACHEL GROSS

LOVE WHAT YOU DO

Four scientifically proven ways to achieve occupational bliss.

BY DANIEL H. PINK

Some jobs are soul-stirring; others are soul-sucking. And thanks to decades of laboratory experiments, field studies, and big data, scientists actually know why. Their research offers crucial lessons that apply Monday through Friday and beyond.

MAKE IT YOUR OWN

Fulfillment often depends on pushing outside formal responsibilities—a process Yale School of Management's Amy Wrzesniewski calls job crafting. In studies of janitors, salespeople, and others, she and her colleagues found that the happiest workers customized their jobs "to better fit their motives, strengths, and passions."

MAKE A FRIEND

The Gallup organization regularly measures US workforce engagement by asking hundreds of thousands of employees 12 questions, including this: Do you have a best friend at work? Employees who answered "yes" were seven times more likely than the typical worker to be engaged on the job.

MAKE A CHANGE

Karl Pillemer is a gerontologist at Cornell University who has spent years interviewing people age 65 and older. On the topic of work, his senior sages are clear: If you hate what you do, get out now. "Spending years in a job you dislike is a recipe for regret and a tragic mistake," Pillemer writes in his book *30 Lessons for Living*.

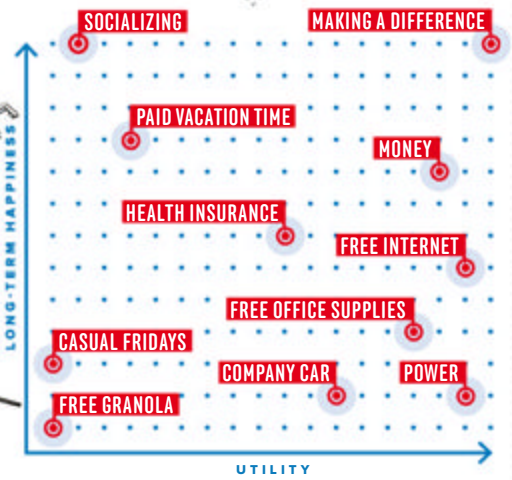
MAKE IT MATTER

Last year Yale's Wrzesniewski teamed up with Barry Schwartz of Swarthmore College to publish a study of a decade's worth of West Point cadets. Some had mainly "instrumental" motives for attending: They chose the academy to boost their careers. Some expressed mainly "internal" motives—to serve their country or become leaders. Years later, those with strongly instrumental motives experienced the least professional success. Even those who had a mix of noble aspirations and careerist goals lagged behind those with purer intentions. The takeaway: Ask not what your job can do for you but what you can do with your job.

Daniel H. Pink is the author of To Sell Is Human, Drive, *and other books about work and behavior.*



YOUR MOTIVATIONS FOR WORKING



RASHIDA SAYS

"I LOVE NAPS. I. LOVE. NAPS. THEY ARE SHEER MAGIC. IF YOU CAN ACTUALLY FALL ASLEEP FOR 20 MINUTES, IT CHANGES YOUR DAY AND IT CHANGES YOUR RELATIONSHIP WITH THE THING THAT YOU WERE WORKING ON BEFORE YOU STARTED NAPPING."



SLEEP ON THE JOB

JEREMY LIEBMAN

DO YOURSELF A FAVOR: Take a nap. In fact, do it right now. Why? Because afterward you'll better understand and remember this very important article. Bonus: You'll also jack up your creativity and improve your fine motor skills, according to Sara Mednick, a psychologist at UC Riverside who studies naps (what a gig!). Midday naps revive you, she says, even if you got plenty of sleep the night before. ¶ Of course, snoozing on the job has a bit of an image problem—it can look a little, you know, *lazy* (or so my boss keeps telling me). Sure, slamming Red Bull more obviously flaunts your will to soldier on, defying the limits of your poor little body. But nodding off for a few minutes may help you bounce back far more effectively. "Sometimes caffeine actually makes you perform worse," Mednick says. "If napping helps some people get more out of themselves, not allowing it would defeat the purpose of having those people in the office." ¶ Even better, suggests Jamie Zeitzer of the Stanford Center for Sleep Sciences and Medicine, drink some coffee, *then* take a nap. The caffeine takes about 45 minutes to kick in—**enough time to duck into a quiet room or your car for some z's**—then wakes you up smarter and happier, without a groggy sleep hangover. "But if you have to choose between coffee or a nap, go for the nap," Zeitzer says. Not convinced? Get some sleep, then read this again. —ROBERT CAPPS



MY DESK

MICHELLE MORRISON

CREATIVE STRATEGIST

SQUARE

OPTIMIZE your SPACE

SECTION 2

When you spend 8, 10, 15 hours mentally scotch-taped to your job, your actual workspace matters a lot. We spoke to a pair of techie-creative types who have found different ways to keep their desks positive, personalized, and productive: One thrives on a minimalist aesthetic, the other prefers a densely populated desktop. But both have customized their spaces for maximum daily happiness. —JULIA GREENBERG

[1]
"I work on a large creative team, set back in the studio. I want people to feel like they can walk up anytime and talk about their projects or ask questions. So I removed the barrier of a large cinema display and added personal touches. That way I'm easy to find."

[2]
"The rabbit pelt was a gift from my partner. We picked it up while traveling through the Arizona desert. It's super-relaxing to run your fingers through it while thinking about a design problem!"

[3]
"Squares often work behind monitors, so a little greenery makes the space feel more natural."

[4]
"I always have a dollar bill on my desk. Mitch, the crocodile skull, usually has it in his mouth. It goes with the payments-company vibe."

[5]
"The beautiful butterflies are from Thailand. They go with the jungle look and feel of my desk. I initially brought them to camouflage monitors in front of me."

[6]
"The water jug helps me track how much water I drink each day. I'll forget if it's not right in front of me."

[7]
"I brought the skateboard in thinking I would use it to commute. I'm pretty clumsy, so I turned it into a footrest instead."

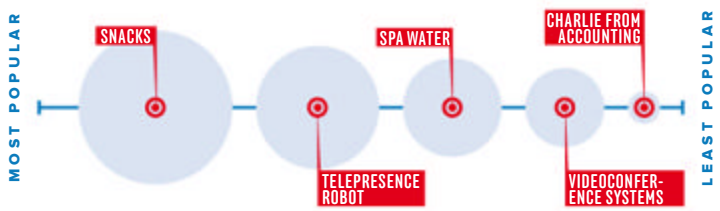
[8]
"I am a huge fan of Gabrielle Hamilton, who runs a fabulous restaurant. Since we often work on food content for Caviar, Square's food delivery service, photographer Eric Wolfinger sent Hamilton's book for photo and food inspiration."

[9]
"Under my desk, I always have paint, pens, and paper to work with. I use them to get ideas out in front of my team before we move into production."

[10]
"Our lead engineer, Justin Schwinghamer, gave Mitch to me after a trip to visit his family in Florida. (Though it may or may not have been ordered on Amazon.)"

"There are other trinkets I've collected from businesses that use Square. I'm inspired by what small businesses and makers are doing."

POPULARITY OF CONFERENCE ROOM AMENITIES



IAN ALLEN

RASHIDA SAYS

"I SEE THOSE DESKS THAT GIRLS WHO HAVE BLOGS HAVE—BIG WHITE DESKS WITH ONE CUTE FRAMED SOMETHING. THAT'S NOT WHAT MY DESK LOOKS LIKE."


10
4
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4

MY DESK

DANNEL JURADO

SOFTWARE ENGINEER

ETSY

"My desk is covered in a bunch of items from lots of places. Stuff is everywhere, but when I'm working, it's not obtruding in any way. I have a bunch of Etsy items, like the space worm and robot, some more utilitarian things, and then vinyl figures that'll float around the office."

[1]
"I started at Etsy straight out of college. When they sent me an offer letter, there was a picture of a robot. The CTO, Chad Dickerson, had picked out a found-art robot specifically for me. It's a supernice memento and reminder of how small we were."

[2]
"At Etsy, when you join you get $100 to spend on your desk. I found a lot of cool things, but the one that caught my eye was this space worm. It's a very large, custom-knit item. But then I decided the space worm needed friends, so I expanded my collection of plushies."

[3]
"Plushies are a small reminder of us working in a community that makes really cool things. They're also just fun. I'll lay my head on them. Other days I'll just throw them against the wall or toss one to somebody on my team."

[4]
"I have a bunch of vinyl toys on my desk, like the Hypnotoad from *Futurama*. But I liked the packaging for the character so much that I've kept it on my desk. People will stop by and say, 'All glory to the Hypnotoad.'"

[5]
"I work in a desk pod with a bunch of people on my team. I'll turn my monitor, so they can see the design I'm working on, with this cool lazy Susan made by a guy in West Virginia."

[6]
"One of our cofounders, Jared Tarbell, used an algorithm to make this block of wood with Space Invaders carved into it. I've always loved the idea of code as art, and it's a great reminder."

[7]
"Four years ago I was feeling bummed out about Valentine's Day, so my friend and I made a pact to be each other's valentine. She sent me a giant glittery card with the Pokémon Charizard on it. I've kept it all these years on my desk."

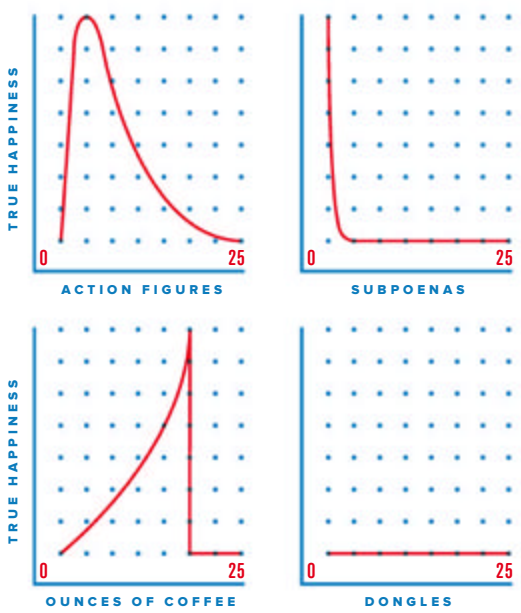
[8]
"The Post-its are one of the consequences of having a desk in a shared space. My coworker Kyle, across from me, uses the back of my monitor as his to-do board."

[9]
"I use the laptop screen for our chat platform. I use my monitor for work."

[10]
"This is my latest purchase from Etsy. It's a *kitsune*, a nine-tailed fox in Japanese mythology. I really like the design and it reminds me of *Okami*, a videogame that I play."

NICHOLAS CALCOTT

DESK POPULATIONS



QUANTIFYING WHAT MAKES WORKERS HAPPY

The people who run furniture company Herman Miller study the effect of office setups on creativity and productivity. And they take it seriously. Consider: They hired phlebotomists to draw workers' blood; they monitored neural activity and skin conductance levels to see how various settings impacted physiology; they watched time-lapse footage of a workplace coffee bar to observe where people congregate; they stuck accelerometers to office chairs; they used video to observe interactions while an eavesdropper took note of conversation topics. Big-picture takeaway? Fostering better social interaction = increased contentment. —LARISSA ZIMBEROFF



SECTION 3

UPGRADE YOUR TOOLS



7 RULES FOR VIRTUAL COLLABORATION

First the good news: Collaboration and communication services like Slack, HipChat, Trello, and Basecamp have made it easier than ever to quit email yet remain in constant contact with your coworkers. Now the bad news: Collaboration and communication services like Slack, HipChat, Trello, and Basecamp have made it easier than ever to remain in constant contact with your coworkers, opening a new universe of boorish behavior. Here are some tips to ensure you don't commit the next-gen equivalent of the accidental reply-all.

—JASON TANZ

[1] BUSINESS IN THE FRONT, PARTY IN THE BACK

Want to jawbone over last night's *Americans* episode? Dying to share a sad-hamster GIF that *totally* captures your mood? Go for it! But don't clog up the #launch_event channel. That's what Slack's #random channel is for. Also, keep it focused—don't mire a productive discussion with corny riffing and painful puns.

[2] USE YOUR REAL PHOTO

That *Ren & Stimpy* character may express your irreverence, but you're here for honest, constructive conversation. Using your real photo will help you all feel like part of an actual team of actual people—collaborating in a virtual space.

[3] TAG SPARINGLY

You'd think twice before texting a coworker on a Sunday, right? (We'll assume you're not a jerk and said yes.) Don't tag them either, unless you *really* want that alert to ding while they're cuddling their newborn.

[4] STAY ON TOP OF THINGS

If you don't want to subscribe to all the rooms or channels where the big projects are being discussed, that's fine. But be sure to set keyword alerts so you don't miss pertinent info.

[5] ASSIGN WORK TACTFULLY

Nobody likes being told what to do—and they particularly don't like seeing a task pop up on their to-do list out of the blue. Give them a chance to volunteer by posting the task in a well-populated channel, or at the very least tag them and ask politely.

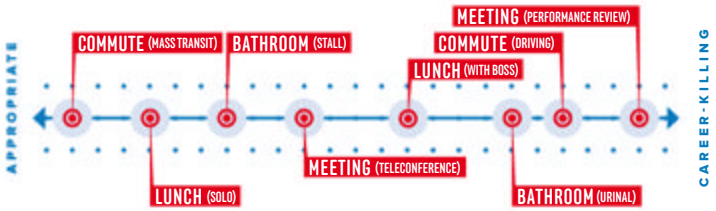
[6] READ THE ROOM

The more people in a conversation, the higher the bar for your involvement. If 95 folks have already weighed in, your two cents are likely worth just two cents.

[7] THINK BEFORE YOU TYPE

When you use one of these platforms, you are writing for the ages—creating a record so that future employees can know how decisions were made or products were created. So be clear, go with common, searchable terms, and try not to use soon-to-be-dated slang like "normcore" or "bokay." Bokay? Bokay.

SMARTPHONE USE



GOEAR = happiness

BY MEGAN LOGAN

JEREMY LIEBMAN

The stuff your company provides will never delight you. To attain job nirvana, you'll have to assemble a collection of real objets d'work.



[A] CRATE & BARREL

Rex Grey Desk Lamp

Treat yourself to some warm, attractive illumination. This wood-and-steel beauty has a cloth cord that adds a pop of anticorporate color. **$100**

[B] DURACELL

PowerMat

Your desk should be your happy place. And if it's cluttered with cords, it becomes an unhappy place. Bring the bliss back with a charging station that maintains a low profile as it keeps your essentials ticking. **$40 and up**

[C] KEEPCUP

Brew Limited Edition Cork

The cork grip insulates your fingers from hot joe, the spill-resistant lid protects your outfit, and the reusability cuts your carbon footprint a little bit each day. **$32**

[D] GRIFFIN

PowerMate Bluetooth

This controller can interact with almost any app on your Mac. Use it to pump up the volume, scroll through docs, and even pan and zoom in creative software. It's the one knob to rule them all. **$60**

[E] B&O PLAY

BeoPlay H8 Headphones

Stellar form, stunning audio, and wireless tech merge into a plush leather, lambskin, and aluminum package. Plus, the integrated mic means you can use them as a headset for closing deals. **$499**

[F] RETRO 51

Classic Tornado Pen

The stainless-steel rollerball pen writes like a dream and looks like the moment Pleasantville snaps into vivid color. Use with caution: You may find yourself volunteering to take notes at meetings. **$25**

EVERNOTE IS AWESOME

It's weird how much I love Evernote. I mean, it's just note-taking software. But for me, the power of Evernote lies in how fast and easy it makes off-loading absolutely everything. It's a dumping ground for all my random ideas, professional and personal to-dos, screenshots, links to stuff I've read (and want to read), photos, quotes, fleeting memories, obscure references by coworkers that I pretend to get but actually need to Google later. It's not an exaggeration to say that **Evernote brings me mental peace.** It even helps me sleep better. As long as I know it's stored somewhere, I can put it out of my mind. I can deal with it later. —ERIC STEUER



RASHIDA SAYS "I'M SO ATTACHED TO CERTAIN APPS. I'VE GOT BINAURAL BEATS FOR NAPS, BITMOJI AND THE SOUTHWEST APP, AND AMAZON PRIME. THE FEELINGS I HAVE ABOUT IT ARE SO POSITIVE. I'M IN A LONG-TERM RELATIONSHIP WITH AMAZON PRIME. AMAZON PRIME IS MY WORK CRUSH."

SECTION 4

MASTER YOUR Relationships



RASHIDA SAYS

"TELEPRESENCE, OH MY GOD. BECAUSE, I MEAN, IT'S BASICALLY SKYPE BUT WITH MORE BODY. ALSO, I LOVE THAT I CAN ADJUST THE HEIGHT, SO I CAN BE TALLER WHEN I'M A ROBOT THAN WHEN I'M A PERSON."

FACE TIME ON WHEELS

Let a telepresence robot keep you in the mix.

BY CHRIS BAKER

To keep those key personal networks humming at work, you really gotta *be* there. For many of us today, though, *getting* there means hours of travel misery. Solution? Make the rounds via telepresence! Just log in to an office bot from your home computer and you're off and rolling. Here's how to get the most from your mecha.

DO

Pivot to follow the talk in meetings. This shows engagement. If you're still pointed at someone who spoke five minutes ago, you look like a stalker.

DO

Ask if your volume is good. People may be embarrassed to tell you you're bellowing your witticisms.

DON'T

Don't be a lurker droid. Announce your presence when you enter a room. Ditto when people saunter by in hushed conversation.

DO

Establish a home base so people know where to find you. It's unnerving to meet a face-on-a-stick in unexpected places.

DO

Assume you're always on. With no peripheral vision, you won't see the boss coming till it's too late. Behave yourself!

DON'T

Don't forget where you are. If you're toggling your computer between the telepresence cam and other tasks, you can easily forget to leave someone's office after a chat. It helps to use a separate screen.

DO

Have a trusted wingman. There will be times when you need a hand—literally. Like when office wags adorn your visage with bunny ears right before a presentation.

DO

Establish boundaries. Your bot is your other body—no one touches without asking! Beware of grabby gadget geeks.

DON'T

Don't attempt elevator pitches. If there's no Wi-Fi in the lift, your surrogate will fall asleep when the doors shut.

DO

Enjoy your newfound popularity. Everybody loves a robot!

ALL YOU NEED IS LOVE

BY JULIA GREENBERG

Your work spouse is your rock. Your work *crush*, on the other hand, is a reason to get up in the morning, tuck in your shirt, brush your hair, and take the long way across the office. Researchers could tell you about how these relationships affect your productivity. We're here to tell you how they affect your will to live.





HOW TO work WITH OTHER HUMANS

BY ROSS MCCAMMON

When I landed my first big job in publishing 10 years ago, I felt like an outsider. It was the social aspects of working in the big leagues that threw me—the small talk, the awkwardness that results from forced extroversion. So I wrote a book, drawing on my own experience as well as the scientific literature on social psychology and organizational behavior. Turns out, it is actually possible to take negative workplace situations and turn them into something positive. But you need a few tricks.

HARNESS THE ASSHOLES

Assholes are overconfident, narcissistic, reckless, entitled, and oblivious. This makes them useful: They let you feel morally superior (since you always look down on the asshole), they're good for bonding (since everyone agrees that assholes are awful), and they increase efficiency (you don't waste time chatting when you're working with an asshole).

BE MILDLY INTIMIDATING

I feel intimidated sometimes. You feel intimidated sometimes. But don't worry! Other people think *we* are the intimidating ones. My personal theory is that two of the key markers of feeling totally freaked out on the inside—silence and a vaguely troubled face—make you seem enigmatic and earnest on the outside. And if you do happen to be intimidating to others, know this: You are setting off their fight-or-flight response, involving a rush of hormones that makes people jittery. So bring the humanity. Try a self-deprecating observation, a compliment, thoughts on the goji berry, whatever. Intimidation is powerful, but intimidation leavened with kindness is more powerful still.

OVERSMILE

Think of something that makes you happy, and smile. Use your eye muscles. Make it "contagious," forcing those around you to smile. (Research suggests that when we see a smile we tend to smile back.) Smile until you feel stupid, then look in a mirror. You'll look happy. And seeing yourself this way will make you even happier. There. You feel better. Everyone else feels better. All because you deluded yourself into thinking you were happy. Just knock it off before you start looking like an asshole.

Ross McCammon is the author of the forthcoming Works Well With Others: An Outsider's Guide to Shaking Hands, Shutting Up, Handling Jerks, and Other Crucial Skills in Business That No One Ever Teaches You.

TAKE YOUR JOB ON VACATION

Bringing work along on your paradise getaway sounds like a good way to defeat the whole purpose. But it could make for a more enjoyable vacation. It's all about something called interrupted consumption, says business psychologist Tom Meyvis of New York University. Basically, when you're doing something pleasurable, stopping the experience and restarting it boosts the effects of the fun stuff and keeps it feeling fresh. Which means that if you're blissfully sunbathing on a beach, checking your email or doing another work thing for a set amount of time can make you return to your lounging with renewed appreciation—as long as it's a (relatively) stress-free task you can finish and forget. So go ahead and mix a little pain with the pleasure. —NEEL V. PATEL



Has an unerring sense of your ideal 3 pm snack.	Is your standing happy hour date.	Joins you in HipChat to vent.	Gives you a look that gets you ready to deal with that annoying meeting.
Is your 3 pm snack (in that one fantasy).	Is to be avoided, at all costs, whenever you're drinking.	Causes you to sign up for Snapchat, just in case.	Gives you a look that gets you ready. Period.



BOY, INTERRUPTED

PHOTOGRAPHY BY ELINOR CARUCCI





BY FRED VOGELSTEIN



THIS IS SAM.

. HE'S MY SON. HIS EPILEPSY CAUSED HIM TO HAVE UP TO 100 SEIZURES A DAY. AFTER SEVEN YEARS WE WERE OUT OF OPTIONS. OUR LAST HOPE: AN UNTESTED, UNPROVEN TREATMENT. THE ONLY PROBLEM?

. IT WAS ILLEGAL.

THE

hospital pharmacist slid three bottles of pills across the counter, gave my wife a form to sign, and reminded her that this was not the corner drugstore. The pharmacy knew how many pills had been dispensed, he said; it would know how many had been consumed; and it would expect her to return the unused pills before she left the country. The pharmacist made it clear that he was not only in touch with our doctor but with the company supplying the medication. They would know if she broke the rules.

Evelyn said she understood and slipped the brown glass bottles into her purse. She and our 11-year-old son, Sam, were jet-lagged. They'd flown from San Francisco to London the previous day, December 19, 2012. Now, 30 hours later, it was just after 7 pm. They'd been at the Great Ormond Street Hospital for Children since midmorning. Sam had been through a brain-wave scan, a blood test, and a doctor examination. Some gel left in his hair from the brain scan was making him grumpy.

Evelyn was terrified. They'd come 5,350 miles to get these pills, medicine we hoped might finally quiet Sam's unremitting seizures. He was to take a 50-milligram pill once a day for two days, increasing the dose to maybe three pills twice a day. Evelyn was to keep a log of his symptoms during their two-week stay. They would need to revisit the hospital two more times before they returned to San Francisco on January 3, 2013. That meant two more rounds of brain scans, blood tests, and doctors' appointments.

We were confident the medicine wouldn't kill Sam or hurt him irreversibly, but the prospect still made us nervous. The pills contained a pharmaceutical derivative of cannabis. People have been smoking cannabis medicinally for thousands of years. Deaths are rare. But Sam would get a specific compound made in a lab. The compound, cannabidiol, known as CBD, is not an intoxicant. (Tetrahydrocannabinol, or THC, is the stuff in pot that makes you high.) Nevertheless, US drug laws made it nearly impossible to get CBD at this purity and concentration in the States.

It had taken four months of phone calls, emails, and meetings with doctors and pharmaceutical company executives on two continents to get permission to try this drug. Sam wasn't joining an ongoing clinical trial. The company made the pills just for him. It believed CBD was safe based on animal studies. It also said it knew of about 100 adults who had tried pure CBD like this over the past 35 years. As a percentage of body weight, Sam's dose would approach twice what anyone else on record had tried for epilepsy. Would it make him vomit or become dizzy, or give him a rash or cause some other unpleasant event? We didn't know. We'd volunteered our son to be a lab rat.

Then there was a bigger question: Would the medicine work? No one knew. The reason Evelyn, Sam, and others in my family—including Sam's twin sister, Beatrice, and Evelyn's sister, Devorah—traveled to London during Sam's winter vacation was that two dozen other treatments we'd tried had all failed. (I stayed behind in San Francisco, scrambling to meet an end-of-year book deadline.)

The one thing we were certain about: This was not going to be a bargain. We'd already spent tens of thousands of dollars on consultants to help Sam's doctors set up the visit, and we were still at the starting line. The best-case scenario was that the medicine would work and eventually we'd be allowed to import it into the US. We secretly hoped that this would encourage the company to make the drug easily and cheaply available to others. We also knew this was quixotic. Our previous experience with medications suggested the whole venture would end in failure. This much we knew: Importing an experimental cannabis-based drug into the US would involve more than giving the company my address and FedEx account number.

IF

you're the parent of a healthy kid, it's hard to imagine yourself doing what we did. Who spends tens of thousands of dollars on anything that's not a house, a car, or college tuition? Who lets their child be the first or even one of the first to try any medication? But Sam was not a healthy kid. He has had epilepsy since he was 4 and a half. We'd tried every possible drug—nearly two dozen medications—plus autoimmune therapy using intravenous immunoglobulin and a high-fat medical diet. (I wrote about our two-year diet experiment in *The New York Times Magazine*.) Little worked, and the treatments that showed some results didn't work for very long or had worrisome side effects.

Sam Vogelstein has had epilepsy since he was 4 and a half. He turned 14 in May.

Sam doesn't have grand mal seizures, the type most people imagine when they think of epilepsy: collapsing and twitching on the ground. Instead, he partially loses consciousness for five-to-20-second bursts. It's a hard-to-treat variant of so-called absence epilepsy. The seizures themselves are more benign than grand mal, and they don't leave him exhausted. But they are also much more frequent. When Sam's seizures are uncontrolled he can have between 10 and 20 episodes an hour. That's one every three to six minutes and sometimes more than 100 a day.

To me, watching Sam have a seizure looks like a movie that's been paused and restarted. He stops and stares vacantly. His jaw slackens. And his head and torso lean forward slightly, bobbing rhythmically. Then it's over, and he resumes life as if nothing happened. If he stopped walking, he'll start again. If he was packing his backpack for school, he'll continue. Though Sam says that he is sometimes aware when he has a seizure, typically his only clue is that when he comes to, everything around him has shifted slightly.

When they are frequent—which has been often—it's hard for Sam to have a conversation, let alone learn anything in school. Sports? Not possible. As a little kid, Sam couldn't even cry without being interrupted: He'd skin a knee, cry for 15 seconds, have a 15-second seizure, and then continue crying. Once, after watching a movie with me, he complained about the DVD being scratched. It wasn't. It just seemed that way because he'd had so many seizures.

And while Sam got little help from the many antiepileptic medications that we tried, he endured plenty of side effects. One drug gave him hand tremors. Another made him violent. A third gave him hives. A fourth made him such a zombie that he drooled, while a fifth made him see bugs crawling out of holes in his skin. Twice his seizures were bad enough that we had to hospitalize him. He'd seen six neurologists at four hospitals in three states. I've seen him seize tens of thousands of times. You'd think I'd be used to it, but I find each one haunting—as if some outside force has taken over his body, leaving me, the person who is supposed to protect him, powerless.

By 2012, when Sam was 11, the only thing that was keeping his seizures controlled enough for him to attend school was massive doses of corticosteroids. If you or anyone close to you has had cancer, bad asthma, or any kind of major inflammation, you know about these drugs, which are synthetic versions of the body's own anti-inflammatory compounds. Taken for a week or two, they can be lifesavers. But taken for extended periods, they wreak havoc on the body.

By the time he reached London, Sam had been on a big dose of the corticosteroid prednisone off and on for a year. It made him gain 30 pounds. It made his face look like it had been pumped full of air—a side effect known as "moon face." And it weakened his immune system. He was starting to get head and chest colds every month. Were he to stay on these drugs at these doses longer-term, he would face stunted growth, diabetes, cataracts, and high blood pressure—all before he was old enough to vote.

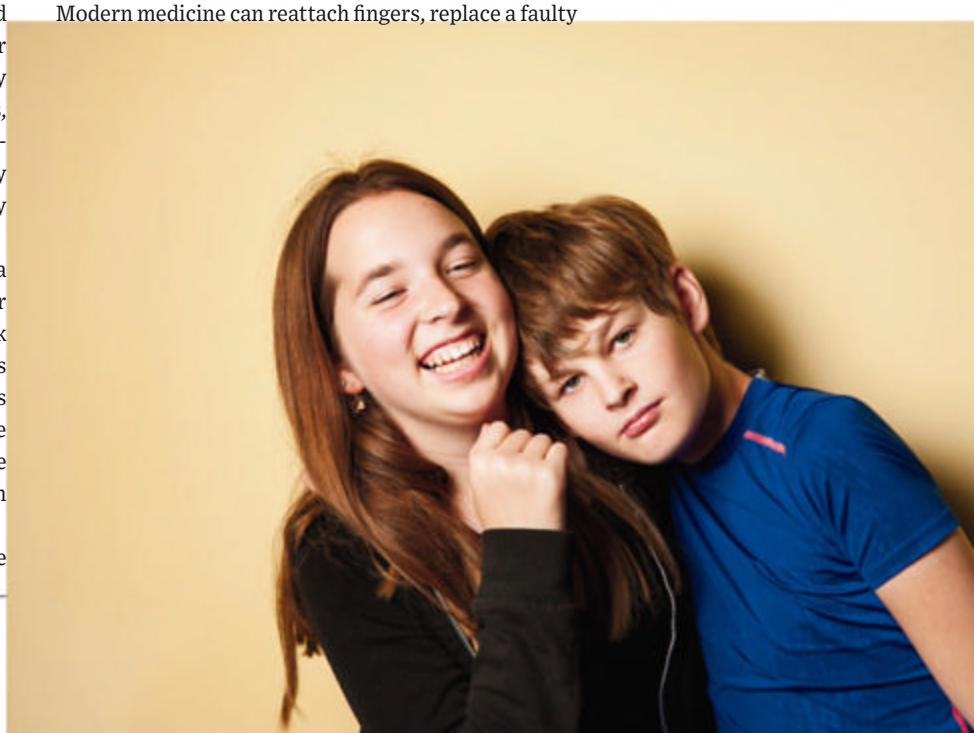
So the trip to the UK felt like a last resort: If these pills got his seizures under control, he'd have as good a chance as any healthy kid to grow up to be a happy, successful adult. If they didn't, well, we were out of options. He might grow out of his seizures, but there were no other medications or treatments that our doctors knew to try. It seemed hard to imagine him ever living on his own.

SAM'S TRYING

situation is hardly unique. About 1 percent of the US population has epilepsy, and about a third of that 1 percent has epilepsy that can't be curbed with medication. That's nearly 3 million Americans with epilepsy and 1 million Americans with uncontrolled seizures. Epilepsy is more prevalent than Parkinson's or multiple sclerosis. More than a dozen antiseizure drugs have come to market in the past 25 years. They've reduced the side effects associated with antiepileptics, but the new drugs haven't proven much more effective at reducing seizures. The number of hard-to-treat cases of epilepsy like Sam's hasn't changed meaningfully in decades.

There are dozens of seizure disorders. Some cause patients to collapse like marionettes whose strings have been cut. Others cause a single limb to twitch. Big seizures can cause brain damage. And tens of thousands of people die every year from *status epilepticus*, a seizure that goes on for more than five minutes and typically requires a trip to the emergency room.

Think of a seizure as an overtaxed electrical grid. The human body is full of electricity that allows brain cells, nerves, and muscles to communicate in an orderly, controlled fashion. A seizure happens when this electricity spikes uncontrollably. As a result, parts of the brain's circuitry temporarily shut down. You'd think medical science would be able to tell you why this happens and what to do about it, but with a few exceptions it can't. Modern medicine can reattach fingers, replace a faulty



Contributing editor **FRED VOGELSTEIN** (@fvogelstein) *is the author of* Dogfight: How Apple and Google Went to War and Started a Revolution.

heart, liver, or kidney, and regrow skin in a petri dish, but the brain's abnormalities remain mostly mysterious and largely invisible.

Indeed, most epilepsy cases are like Sam's, idiopathic, a fancy way of saying "no known cause." A typical prognosis: If we can control the seizures with the first three meds, he'll probably never have another one. If we can't, the future is less certain. Beatrice developed absence epilepsy when she was older, in 2010. The first drug made the seizures disappear. She took it for two years. We have never seen another seizure.

There was nothing invisible or mysterious about Sam's epilepsy in London, however. By the time he and Evelyn arrived, his seizure count was approaching its highest level ever. We had expected this. We'd reduced one of the drugs helping to control his condition five days before they left. If the drugs in London worked, we'd need convincing data to get permission to import them into the US. To get convincing data, we'd need to show a marked reduction in seizures.

It was not easy to watch. Two days before departure he had eight seizures. One day before departure he had 25. The day of departure he had 20, including 12 in the 88 minutes between 5:50 pm and 7:18 pm, immediately after the flight to London took off. By the end of the next day, when they picked up Sam's pills at the Great Ormond Street Hospital pharmacy, his seizures had more than tripled to 68. Past experience told Evelyn that if the pills didn't work fast, the following day would be a complete wipeout with more than 100 seizures.

MY FIRST REACTION TO THE IDEA OF **CANNABIS** TO TREAT SAM WAS THAT IT SOUNDED CRAZY. I ASSOCIATED POT WITH PARTYING, NOT TREATING MY SON'S SERIOUS ILLNESS.

THE

first time Evelyn and I talked about cannabis as a treatment for epilepsy was in early June 2011. The high-fat diet Sam had been on for two years had stopped working. There were no more conventional antiepileptic drugs to try. In our scramble to find solutions, Evelyn learned that a nurse-practitioner in one of our doctors' offices was starting a cannabis collective—outside of work—to help some of the physician's sickest kids. Other parents of epileptic kids we knew were joining. Besides having a medical degree, the nurse was an herbalist. She'd heard that cannabis—if made into oil-based tinctures, taken by the drop instead of smoked—could help people with intractable seizures.

Evelyn liked the fact that the nurse sent her a 1981 paper from *The Journal of Clinical Pharmacology* on cannabinoids as potential antiepileptics. And she liked that the nurse assured her that the cannabis being used wouldn't get anyone stoned. It would be high in CBD and low in THC.

Neither of us wanted to join the collective immediately. We had two other options for Sam we wanted to try first—corticosteroids and intravenous immunoglobulin. We also knew that if we were going to ditch Western medicine to treat Sam's epilepsy, we'd have to do a lot more homework. Many people, often justifiably, hate drug companies. But one thing they are good at is making sure that every pill, drop, or spray of medicine they supply is exactly the same. Treating Sam's epilepsy with cannabis would mean the reliability, consistency, and potency of his medicine was no longer assured.

My first reaction to the idea of trying cannabis to treat Sam was that it sounded crazy. I'd smoked plenty of weed in college and in my twenties. I knew the plant could have real medicinal effects; medical cannabis was legal to buy in California with proper documentation. But rightly or wrongly, the idea of controlling Sam's seizures with cannabis—he was 10 at the time—alarmed me. I associated pot with partying, not treating my son's serious illness. I hated having the two thoughts side by side.

But the desperate can't afford to be doctrinaire. And by the time another year had passed, we were desperate. Intravenous immunoglobulin hadn't worked. And it was becoming increasingly less safe to control Sam's seizures with high doses of corticosteroids. In May 2012 we wrote a $600 check to join the cannabis collective.

We knew to expect uncertainty. Plants as medicine are by their nature variable in potency. The nurse was still trying to figure out which strains worked best and the optimal way to turn those strains into tinctures. And while some parents were reporting good results, no one was seizure-free.

But over the previous year we had also learned that treating epilepsy with cannabis wasn't crazy at all. A small but growing body of research suggested that CBD might be a powerful anticonvulsant. Evelyn took particular note of a 2010 paper in *Seizure*, the medical journal of the British Epilepsy Association, that she found through a Google search. With charts and tables sprinkled over eight double-columned pages, the authors said that extensive tests on rodents in their labs, along with previously published data, "point to CBD being of potential therapeutic use (alone or as an adjunct) in the treatment of epilepsies."

And then, remarkably, the first tincture we tried from the collective seemed to ratify those findings. For three days, Sam's seizures went from what had been 10 to 20 an hour to about one every hour. The tincture was odd-looking—a bunch of cannabis leaves and stems in a brown mason jar marinating in oil. Using a syringe, we'd put a drop of the liquid on Sam's tongue three times a day. It was supposed to be 20:1 CBD to THC.

But in July, coinciding with a new tincture, Sam's seizures came roaring back. By the middle of the month he was having around 10 an hour. We tried increasing the dose. We tried tinctures bought at three medical cannabis dispensaries. They didn't work either.

By mid-August we were thinking about putting Sam back on steroids. That was when the collective received test results for the latest batch of tinctures. They'd been advertised as having a 20:1 ratio of CBD to THC, but it turned out there was little CBD or THC in any of them.



Sam's twin sister Beatrice's epilepsy disappeared after one week on medication.

We also tested one of the other tinctures we'd bought from a supposedly reputable supplier. We'd been told it was 10:1 CBD to THC. It was really 3:1. The tincture that seemed to work for Sam in June hadn't been tested, so we had no idea how to assess the temporary drop in seizures.

The experience with the unscientific methods of the collective and with the false labeling of products in dispensaries was infuriating and demoralizing. We knew the collective was still finding its way when we joined. And we knew that buying tinctures at dispensaries wasn't like going to Walgreens. But somehow we convinced ourselves that the collective had mastered the basics—that you don't tell parents a medicine is a certain potency unless you've had it tested. We really only had ourselves to blame, though. We didn't have the tinctures tested either.

One parent we met through the collective decided to try to make a high-CBD tincture in her garage. Catherine Jacobson, whose son, Ben, also has epilepsy, has a PhD in neuroscience. She developed a method that took three days plus another five days of testing to produce a three-week supply.

It was anything but simple. She started by heating the cannabis for 30 minutes in her oven at 350 degrees to activate the THC and CBD. Then she put it in a plastic bag, crushed it, and dumped it into a beaker filled with ethanol. She let the mixture sit overnight on a stir plate, lab equipment which agitated the mixture, pulling the compounds out of the cannabis and into the ethanol. Then she strained it and put the ethanol on the stir plate for another eight hours until most of the liquid had evaporated. On the third day, she ran the mixture through a carbon column, using a vacuum pump. The column, which looks like a glass cylinder with carbon beads over a small opening at the bottom, separated CBD from the THC based on molecular weight. At the end of the process she'd have ten 10-milliliter test tubes. After testing, two or three would have a high-enough CBD-to-THC ratio to be usable. She'd concentrate those further to make medicine. Jacobson's setup could only handle about a quarter pound of cannabis at a time.

That meant that if she started on a Friday night and spent all day Saturday, another half-day on Sunday, and waited another five days for test results, she'd have a 10-day supply of CBD the following weekend. The cost: about $750 for the cannabis and another $200 for ethanol. Two labs tested it at more than 100:1 CBD to THC. Ben and Sam seemed to respond to it. But she was only able to give us five days' worth because it had been so labor-intensive to make.



SOMETHING

else was happening throughout the spring and summer of 2012 that I only found out about much later. Evelyn had started wondering how to contact the head of a drug company in the UK. She'd been thinking a lot about that article in *Seizure*—the one that documented how pure CBD slowed seizures in rodents. But it wasn't just the encouraging results that caught her eye. It was the authors, all researchers at the Schools of Pharmacy and Psychology at the University of Reading, one of the

An article in a medical journal led Evelyn, Sam's mom, to reach out to a British drug company that makes cannabis-based medicine.




USA

UK's top research institutions. She noted that they had thanked GW Pharmaceuticals, a British company she'd never heard of, for funding the study.

GW, we soon learned, manufactured pharmaceutical-grade extracts of both THC and CBD. Its main business came from a drug called Sativex, which contains a mix of the two compounds in a mouth spray for sufferers of cancer pain or multiple sclerosis. But it also seemed to have supplied pure CBD to the authors of the *Seizure* study.

For Evelyn this was revelatory. CBD was the only thing left that might help control Sam's seizures. And over in the UK there was a drug company making the stuff by the pound. The next move was obvious: Find out who ran GW—she quickly determined that his name was Geoffrey Guy—and figure out how to contact him.

She emailed the GW general mailbox and called the main phone number and left a message. No response. And then on August 17, 2012, we had a heated conversation with my dad. We were visiting him at his house in Wyoming, and he sat us down wanting to know what the next steps were with Sam. He was worried that the constant struggle was crushing our family. He was also worried that we'd given up, that in our desperation we'd become like acrophobic climbers, terrified to change our position on a cliff despite only being 5 feet off the ground. That was painful to hear, but it also gave Evelyn an idea. She came to breakfast the next day and said, "If you really want to be helpful, get us in touch with Geoffrey Guy."

And that's what he did. His firm, Warburg Pincus, had been doing business in London for 25 years. On August 20 he emailed some associates, detailing Sam's situation. Eleven days later Geoffrey Guy wrote to Evelyn asking how he could help. Later that day he told Evelyn on the phone that figuring out a way for Sam to try GW's CBD was eminently possible, and that he would do what he could to be helpful.

What we didn't know at the time was that Guy and his team had already been wondering about human trials with CBD for epilepsy. And it turned out that the kind of one-patient experiment we were suggesting wasn't unheard-of in the UK. Doctors there can get promising medications for their patients from the manufacturer to be used under their direct responsibility. It's known as administering on a named-patient basis. No regulatory approval is required as it is in the US. Guy said he'd done it with more than a thousand patients in his career. "I have been looking for a number of years at using CBD in just such a situation," Guy says. "You are a parent of a child who had a specific need. All other medicines had failed to help. We had a medicine that might help. Why on earth would that not be a good and wholesome thing to do?"

The catch was that GW would only consider helping us get CBD for Sam if we did it completely aboveboard. We couldn't try the drug in the US. We'd have to go to the UK. We'd need our US doctor's permission. We'd have to find an epilepsy doctor in London to take our case and to agree to supervise the treatment and various tests.

And if the medication worked, we'd need to navigate a labyrinthine approval process to legally import the drugs into the US. The research ethics committee at our doctor's employer, UC San Francisco, would have to approve our plans to administer the medication at the hospital. Would a public institution like UCSF, dependent on federal research grants, agree to oversee treatment with a quasi-legal drug? The US Food and Drug Administration would need to sign off on what we were doing. The FDA has a process for individuals to get approval to try unapproved drugs on a so-called compassionate-use basis. We'd heard the applications were typically hundreds of pages long.

And then we'd need clearance from the US Drug Enforcement Administration. The head of the DEA at the time, Michele Leonhart, took a hard line on cannabis, which to this day remains listed as a Schedule I drug, supposedly as dangerous and addictive as heroin. Despite legalization efforts in some states, it's the federal government that controls the borders, and to get any illegal drug across the border you must get approval from the DEA.

The magnitude of the undertaking was daunting, not to mention the cost. Just traveling to London, staying for two weeks, and paying doctors' bills out of pocket would run into the thousands. We'd have to hire consultants to draft our applications to the FDA and DEA. Our doctor hadn't done anything like this before. The only way she was going to be able to get behind it on our behalf was if we handled all the paperwork for her.

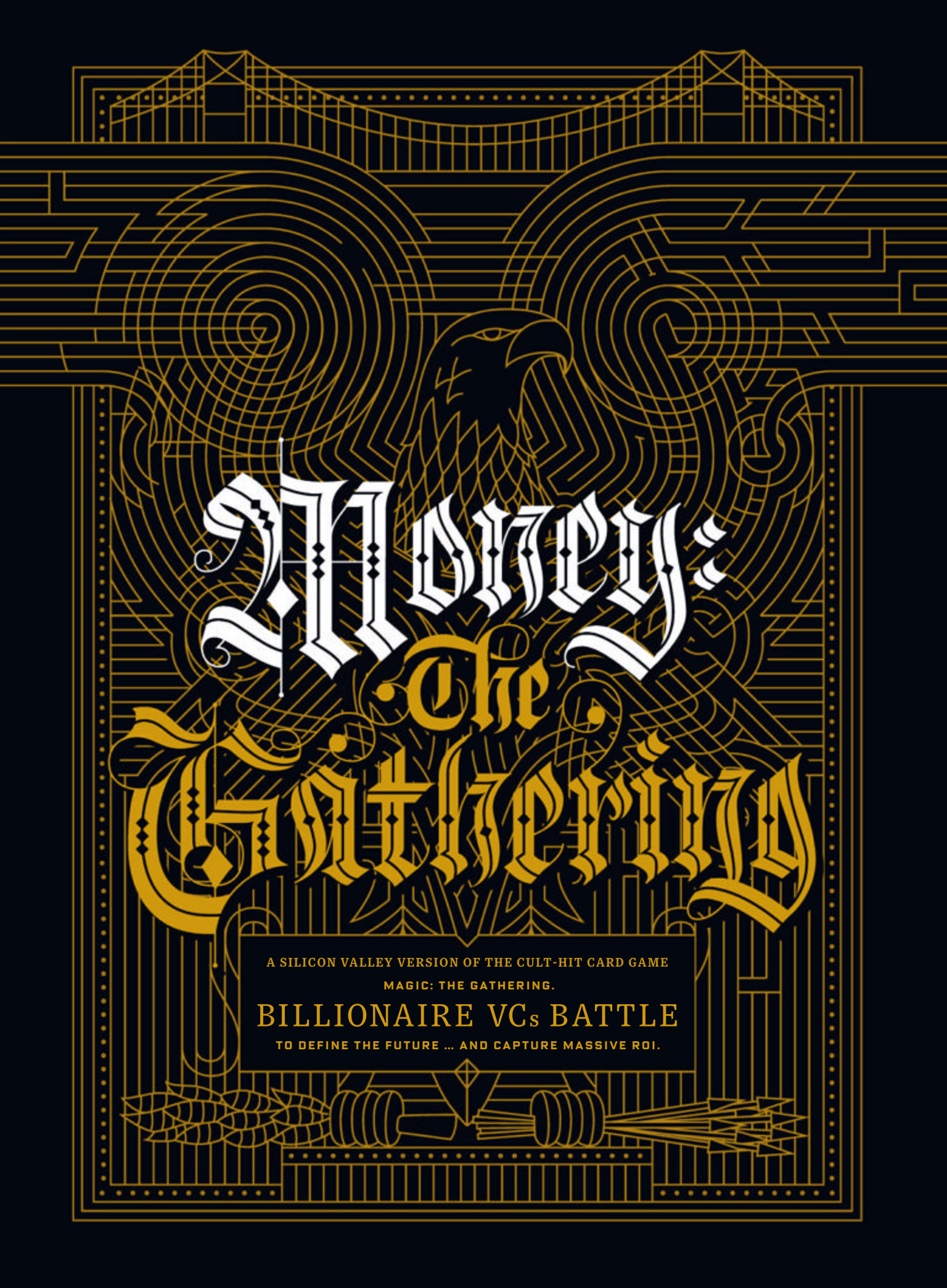
WE

met Geoffrey Guy face-to-face in a conference room off the eighth-floor neurology waiting room at UCSF. We were dressed like we lived in California. Guy was dressed like an early-20th-century English banker. He wore a double-breasted suit, a white-collared blue shirt with French cuffs, and a yellow tie with blue polka dots. Evelyn and I had been exchanging emails with him since the end of August 2012. Now, in early December, we were sitting down to discuss some last-minute details of our London trip. The meeting was also an opportunity for Guy to talk with Sam's new doctor, Roberta Cilio. Sam's longtime neurologist had had to take an emergency leave of absence the week before. Cilio, an eminent Italian physician who had only joined the staff of UCSF the previous September, was jumping into the middle of an unfamiliar case. We were meeting her for the first time too.

We knew little about Guy at that point other than the essentials: He was a longtime biotech entrepreneur, and he had an experimental compound that, turned into a drug, might help Sam.

We learned later that he'd started three notable drug companies and brought more CONTINUED ON PAGE 108

Sam wanted the story of his treatment to be told. "People need to know what this looks like," he says.


Money:
The Gathering
A SILICON VALLEY VERSION OF THE CULT-HIT CARD GAME
MAGIC: THE GATHERING.
BILLIONAIRE VCs BATTLE
TO DEFINE THE FUTURE ... AND CAPTURE MASSIVE ROI.

BY BRYAN GARDINER

YOU ARE THE MOST POWERFUL BEING IN THE VALLEY. You are a venture capitalist, an elite investor who travels the world and identifies key trends years before East Coasters and poor people do. The object of this (playable) card game? To find and transform young startups into disruptive, revolutionary, billion-dollar companies. It won't be easy: Few are born each year. Most perish before their potential can be realized. Without your wisdom and magic, none stand a chance. You have enemies—other powerful VCs whom you battle for a 20 percent stake and legendary returns. Intellect, reputation, and the smell of money are your weapons. Use them to conjure mythic creatures and spells that will destroy all who stand in your way. But beware: The venture capital world is an expanse of hype and hubris. Your survival isn't just about acting decisively; it also hinges on having a finely tuned bullshit detector (and bullshit constructor). You hold the future in your hands. Invest wisely.



CARD NAME

COST You have to pay to play each card—in mana, the currency of the game. There are three kinds: Cash (green), Intellect (blue), and Swag (red). The gray diamonds mean you can pay with any currency type.

FUNCTION AND FLAVOR What does a card do? Read what's in this box. There's also italicized *flavor text*, which captures the spiritual essence of the card's power.

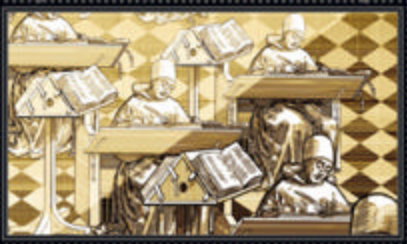
CARD TYPE You will fight your battles with five main kinds of cards: Creature, Sorcery, Instant, Enchantment, and Artifact. For a full breakdown of these types and the other rules, visit WIRED.*com/mtg*.

POWER & TOUGHNESS Creature cards like this have two values: power (left) and toughness (right). Power is how much damage it deals; toughness is how much abuse it can take.

ILLUSTRATIONS BY
KEVIN CANTRELL AND FELIX PETRUŠKA

SPECIAL THANKS TO ROSS FUBINI, CANAAN PARTNERS, AND DAVID ROSENTHAL, MADRONA VENTURE GROUP

HOST HACKATHON



SORCERY $

Choose any Enchantment, Sorcery, or Instant card not currently in play and bring it into your hand.

The right idea can cost millions—or you can get one for the cost of a few pizzas.

VC firms often use hackathons to spot fresh talent and new ideas. They're also good for measuring the pulse of the developer community.

RON CONWAY



LEGENDARY CREATURE $

This creature's moves are so swift and sure, they can't be blocked except by creatures with similar abilities (a state known as *flying* in the language of the realm).

Early-stage angels bring cash when a company needs it most: before it is earned.

2 / 1

An "inside round" is when existing investors chip in a little more cheddar. It can be a good sign—the company is crushing, and investors want a bigger stake—or it can be bad, indicating that a startup can't attract new money. But it's always hard to tell from the outside.

LARRY & SERGEY



CREATURE—FOUNDERS $

In addition to doing its own damage, gives all of your active creatures a +1 boost to both power and toughness.

In the presence of the founding fathers, thine army shall glow with the power of data science (and money).

1 / 2

INSIDE ROUND



ENCHANTMENT $

Any selected creature gets +2 power and toughness.

All is well. Nothing to see here.

BRYAN GARDINER (@bsgardiner) *wrote about Gorilla Glass in issue 20.10.*

ADD BOARD MEMBER



· INSTANT · $

Deflects a spell cast by your opponent.

I've got your back, bro.

Adding an experienced board member can protect your company, ground cocky founders, and bring monster cred when you need to raise cash.

Your reputation is one of your most valuable assets—it must be burnished and protected. A PR team makes sure that attacking your company's good name comes with a cost.

BLOCK INVESTMENT



· ENCHANTMENT · $

Prevents one of your opponent's creatures from attacking on the next turn. (As the magi say, does not untap during untap step.)

Sometimes playing dirty pays off.

Blocking a VC from throwing money at another company can keep him from winning big—and becoming a threat.

One of the major exit strategies for a venture capital firm. Get paid and get out.

HIRE PR TEAM



· ENCHANTMENT · $

Opponent must pay 1 mana for each of his creatures that's active on the battlefield.

We don't comment on rumors or speculation.

ACQUISITION



· SORCERY · $

This card cannot be countered. Destroys all creatures on the board.

ROI is also the French word for king.

MICHAEL MORITZ



· VC WARRIOR · $

This creature's eye for moneymaking magic—rather than industry tricks—makes him hard to challenge. (Another badass flying card.)

Breakthroughs aren't born in business school.

7 / 4

Also known as a series B, C, or D round, this cash infusion finances important moves: staffing up, building new products, and buying killer snacks.

GROWTH ROUND

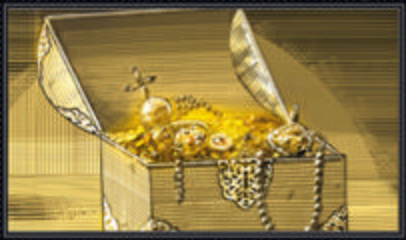


· INSTANT · $

Gain 3 life.

Mo' money, mo'... money.

ENTREPRENEUR FUND



· ENCHANTMENT · $

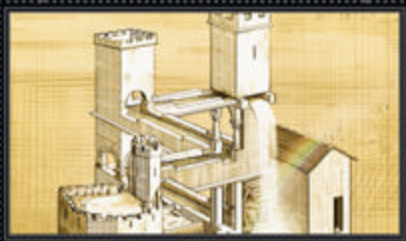
Your active founders get +2 power and toughness.

If at first you don't succeed... get paid anyway.

Why sign with your firm? Because it makes money. Entice a promising founder by offering him a share in an entrepreneur fund, which pays out based on the success of the other companies you back.

Recycling—reinvesting profits from your portfolio into existing investments—is a great way to bet big on promising startups.

RECYCLING

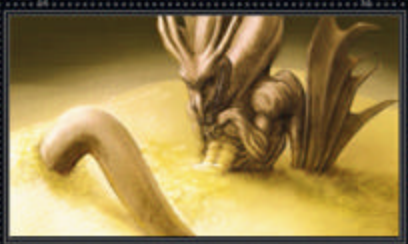


· ENCHANTMENT · $

Every time one of your creatures dies, you gain 1 life.

The true mark of power is creating money from little more than the San Francisco fog.

GO IPO



SORCERY $

Destroy every active Creature, Artifact, or Mana card except VC Warriors. If you destroy six or more—mana not included—your opponent takes 6 damage points.

Your riches shall transubstantiate from paper to penthouses, Panerais, and Porsches.

The greatest payday in the VC world: selling shares to the unsuspecting public at a high profit.

MARY MEEKER



VC WARRIOR $

Only the righteous may bask in the glow of the Internet Trends annual report. All creatures regenerate fully.

"All must kneel to my 196 slides of power!"

4 / 5

Sometimes a founder can actually hinder his startup—mistaking obstinacy for vision. Getting him out of the way can pave the road to rational decisions.

THE KUTCHER



CELEBRITY · CREATURE $

Does 1 point of damage to the creature of your choice, and takes thrice that to kill—because this dude JUST. WON'T. GO. AWAY.

"My mind's always doing things that I don't even know about."

1 / 3

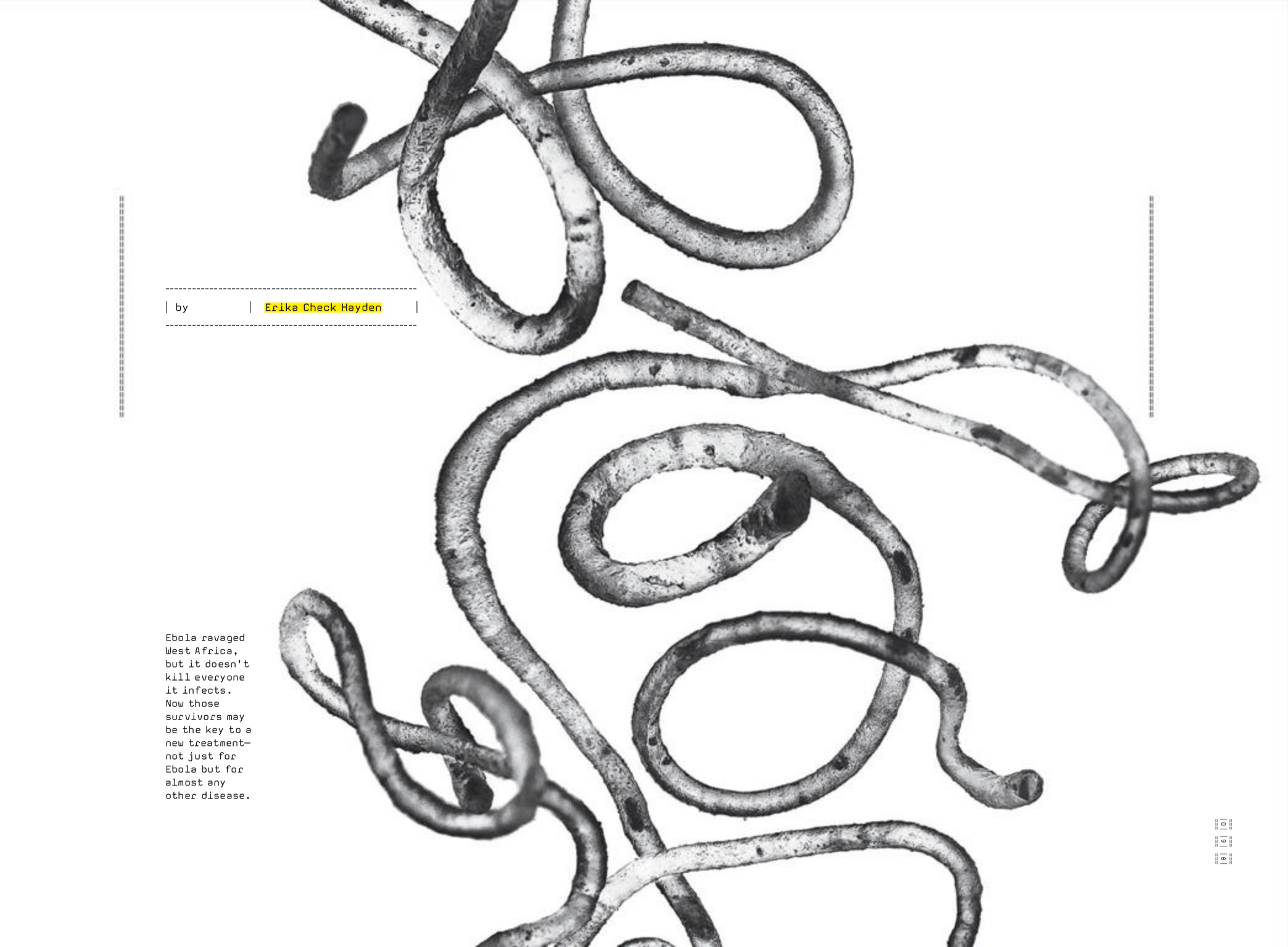
FIRE FOUNDER



ENCHANTMENT $

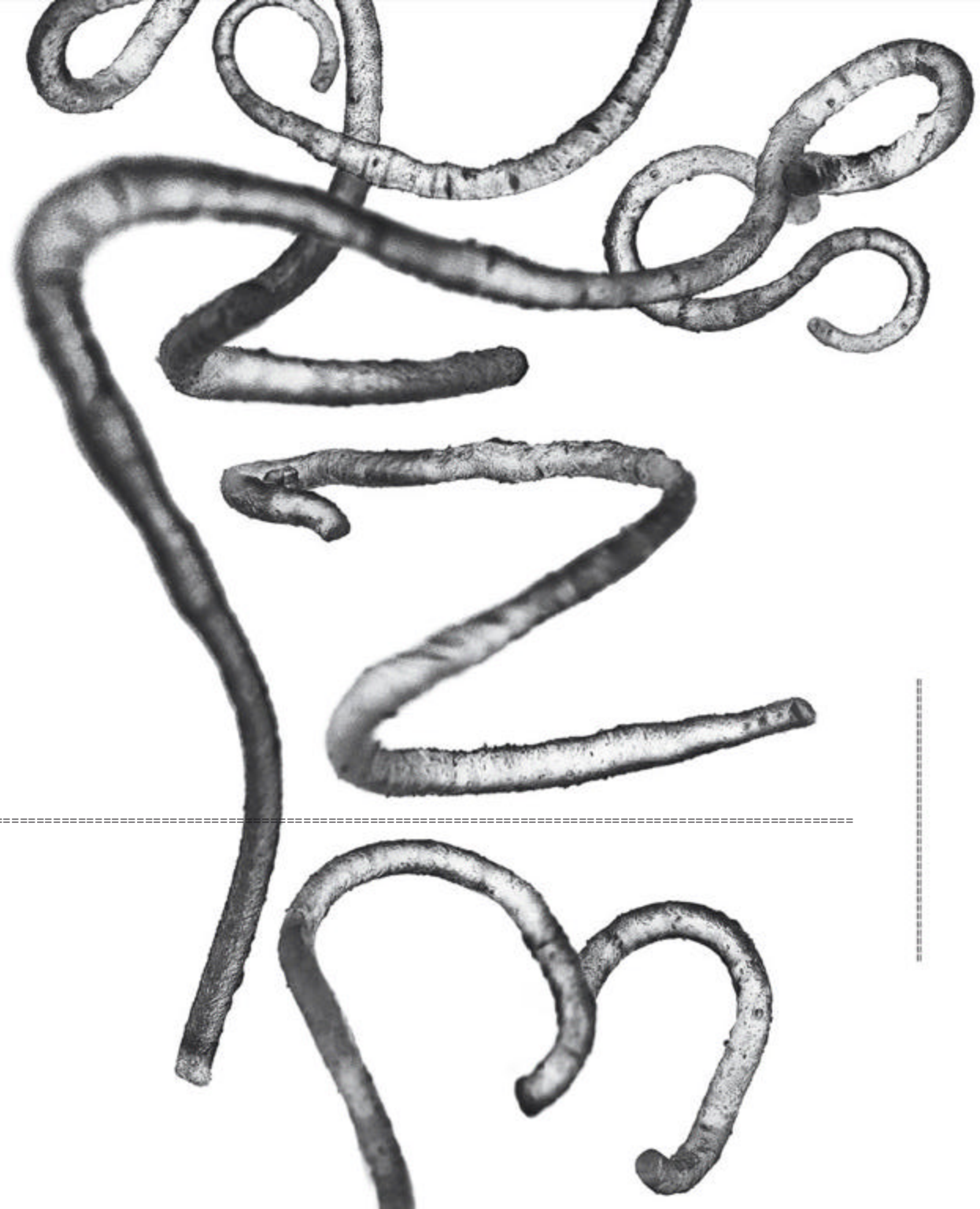
No longer encumbered by that Original Ego, all Founders, Legendary Creatures, and VC Warriors on the battlefield gain +2 power and toughness.

Think of it as early retirement.



by | Erika Check Hayden

Ebola ravaged West Africa, but it doesn't kill everyone it infects. Now those survivors may be the key to a new treatment—not just for Ebola but for almost any other disease.



| Illustration by | Sean Freeman |

| Photography by | Daymon Gardner |



LINA MOSES sensed the ghost of Ebola as soon as her Land Cruiser entered the gate at Kenema Government Hospital. More than a hundred people had died in the treatment center here, an epicenter of the epidemic in Sierra Leone. A doctor who had treated them was buried on a hill overlooking the compound. When Ebola erupted in Kenema in May 2014, Moses was working here as an epidemiologist. She had never seen an Ebola patient. She could have fled home to New Orleans. Instead she stayed, fighting the outbreak and watching patients and friends die one by one.

Eventually Moses returned to the US. But now, two months later, she and one of the people she'd worked with, a physician named John Schieffelin, were back. Moses' driver eased the Land Cruiser up to her old lab, a single-story building tucked in the corner of the hospital compound. Workers appeared and started to help unload supplies. Moses, meanwhile, stepped out into the searing midday heat and stretched her legs. She saw six people sitting on the concrete steps of an office across from her lab. Some had been nurses and researchers at Kenema; a couple were part of a newly formed survivors' union. That's how they'd heard about Moses' mission.

All six had been infected with Ebola and survived. Hypothetically, that made them immune to the disease. That's why Moses had returned—to harness that immunity to try to ensure Ebola never killed anyone again.

After getting set up, Moses beckoned the survivors into the lab. A technician slid needles into their veins. The survivors' blood flowed dark red into purple-topped tubes. Moses watched in silence. Once that fluid had been a mortal danger; now it was a valuable commodity.

When the blood collection was over, Schieffelin passed a survivor outside who didn't recognize his doctor. Schieffelin covered most of his face with his hand, imitating the mask he'd worn in the wards. "Do you remember me now?" he asked, smiling behind his palm.

Later, Moses' boss, a virologist named Robert Garry, separated the cells they needed from the blood, washed them, and added a pink buffering liquid to each tube. Garry printed the date—January 12—and an ID number on each tube, then put the tubes into a Mr. Frosty–brand insulated container. Mr. Frosty, in turn, went into a portable freezer. Tucked safely inside, the samples chilled over the next four hours; it was crucial that they cooled slowly, so ice crystals wouldn't destroy the cells.

Finally, at 11 that night, Moses and Garry donned purple disposable gloves, popped open the lid on Mr. Frosty, and loaded the little labeled tubes into metal cases cooled with liquid nitrogen. She handled each tube for no more than a few seconds. Even the tiny bit of heat from her fingers could warm the cells inside enough to kill them and destroy the knowledge they contained. She shut the case, ready for a journey to the United States.

Past Ebola outbreaks killed as many as 90 percent of the people who got the disease. This most recent one did not—as many as 60 percent of infected people survived. Nobody is sure why. It might have had something to do with the particular strain of the germ; for example few people bled from their eyeballs this time. Or maybe it had to do with the better standard of care many of the infected received. Regardless, thousands of people got sick but didn't die. By definition their immune systems now make antibodies to the virus, proteins that can fight Ebola and win. Those antibodies are, essentially, the ideal medicine. Or rather they would be, if someone could unpack the biochemical manufacturing process that creates them.

Those cells Moses had collected contained the key, the blueprint for making that hypothetical drug. Scientists at Tulane University in New Orleans were waiting to try to do just that. And if they succeed? They might unlock not only a new treatment for Ebola but also a way to make new treatments for any virus, a broad-spectrum method for making drugs against diseases both common and rare, from influenza to Lassa fever. It would be a potent treatment option where today next to none exist.

Moses had tried this once before. In November she had collected another set of samples, but paperwork delays grounded the shipment in Sierra Leone. The cells thawed and died.

Now she was back at Kenema, back at the hospital where she had seen so many people die, to try again. Packed in liquid nitrogen, the blood would last 14 days—and it had to get safely back to the US. Moses had to get it onto a flight out of the airport near Freetown, the capital, by the day after tomorrow. But first Moses would have to get the samples through a countryside ripped apart by a biological apocalypse. The clock was ticking.

[T]

TWO DAYS LATER, Moses woke at 7 am, drank a glass of water for breakfast, and headed back to the lab. Today was transit day, and she still needed to print shipping labels and get money to pay for her driver and gas. Simbirie Jalloh, the logistics specialist at Kenema, had arranged for someone to deliver the money to Moses. That person was nowhere to be found. Jalloh was away at an Ebola task force meeting, and the only working printer was in Jalloh's office. Which was locked.

Moses paced around her transportation, a Toyota Prado SUV, as the town woke up. Car horns chattered on the road outside the hospital's front gate. Women with babies lashed to their backs hurried down gravel-strewn paths to appointments alongside hawkers selling cell phone chargers and sweet cakes from plastic tubs. Moses had hoped to be on the road by now; she had to arrive in Freetown by 11:30 am to get her samples onto a ferry across Tagrin Bay to the international airport in Lungi. From there they'd catch a flight to Brussels that night, and then another to Chicago and then finally New Orleans. Freetown

ERIKA CHECK HAYDEN (erika.check.hayden@gmail.com) *covers science for* Nature. *She wrote about Indian pharmaceutical companies in issue 14.12.* *Research for this article was supported by the Pulitzer Center on Crisis Reporting.*

and Lungi are only about 200 miles northwest of Kenema, but that still meant a four-hour drive on a good day. The epidemic was still raging through Sierra Leone, so there were Ebola checkpoints along the way, where officials tested everyone for fever.

The morning dragged on; Ensah, the facilities guy, arrived at 8 and let Moses into Jalloh's office. Moses sweated as she printed the shipping labels—it was already 80 degrees—and affixed them to the two bullet-shaped dry shippers with packing tape. But she still didn't have the money.

By 8:30, Moses was panicking. Her driver, John Sesay, was sitting on a bench under a palm tree. He calls her Dr. Moses—though she's a doctor of nothing practical—and she calls him Dr. Sesay, a doctor of driving. But Moses was in no mood for jokes. "I can't wait for the money," she snapped. "John, let's go."

Sesay jumped up, surprised: He usually got paid first thing in the morning. But he could tell Moses was on edge and didn't ask any questions. "Yes, Dr. Moses," he said. Moses loaded the shippers, each 25 pounds of coolant and metal about the size of a party keg, into the rear of the SUV.

Geared up, the Toyota pulled out of the hospital gates with 30 blood samples—from the six who'd been waiting for Moses in the Kenema courtyard and 24 more—all frozen in liquid nitrogen. Moses dialed a friend in Bo, the next town along the road, and asked for $400, borrowed from money Moses herself had lent to pay for kids' school fees.

Forty minutes later, Sesay pulled into a gas station just outside Bo, where Moses' friend was waiting with a bag of cash. But the pumps were out of diesel. So, too, were the next two stations they passed. They saw a man on the roadside selling fuel from water bottles, and Moses thought about it. The whole town might be out. But it would take forever to fill the tank from the little 1.5-liter containers. With an eighth of a tank left, they decided to check one more station, a run-down shop in the center of town.

They were in luck—the attendant gassed up the Toyota, Moses paid him, and they were on their way at last. It was almost 10 am. They had an hour and a half to go 150 miles.

[B]

BEFORE EBOLA STRUCK, Moses had been in Sierra Leone for five years, finishing her dissertation for Tulane and working with a consortium of researchers and institutions studying viral hemorrhagic fevers. At Kenema, Moses led a team of people doing surveillance on the prevalence and spread of Lassa, a fatal disease that's common in Sierra Leone but that most people in the West have never heard of.

In late March 2014, Moses' network started getting reports that a different viral hemorrhagic fever had crossed from Guinea into Sierra Leone: Ebola. She sent a couple of surveillance officers to check out the reports at a place called Buedu, but they came back having found no sign of the disease. Moses and a Kenema doctor, Sheik Humarr Khan, were trying to figure out what the field team had missed when they realized that there were probably a lot of villages with similar names. Khan pulled out a map and almost immediately they spotted a village called Boidu, 30 miles northwest of where they'd sent their surveillance guys. It was on the border between Sierra Leone and Guinea. "Lina, I think you should go there," Khan said.

After two days on dirt roads, Moses and a team got to Boidu. When she arrived, she saw a fresh pile of red dirt behind one of the houses: a grave. Her team started to ask the locals questions. Yes, a man had been buried here; yes, his son had died too, after helping him. The villagers said they had washed the dead men carefully before burial—as was customary.

Moses and the team pressed. Who cared for the men? Who touched their bodies? The villagers started to pull back. "You could see them start to realize, 'Oh shit, we did something



Lina Moses

An epidemiologist working in Sierra Leone, Moses was one of the first Western researchers to encounter the outbreak. She later returned to find a way to fight it.

| 1 |



| 2 |



| 3 |



MOHAMMED ELSHAMY/ANADOLU AGENCY/GETTY IMAGES

EVERYTHING ABOUT TREATMENT CENTERS IS DESIGNED TO CUT WORKER RISK.

wrong,'" Moses says. They started to change their stories. They said that an aunt had carried the sick son to a clinic for treatment—then said she'd had nothing to do with him. Moses hoped they'd still escape the disease somehow. But if it was Ebola, it was going to spread.

A couple of months later, the lab at Kenema received a new sample to test: blood from a sick local woman. She was positive for Ebola. So were two patients who had been admitted. Khan called the staff together. "Guys, come around," he said. "Ebola is with us in this hospital at last."

After that they poured in, day after day. Lassa and Ebola have some symptoms in common, including (sometimes) Grand Guignol–like bleeding, so Moses and the Kenema team thought they were prepared. But the surge overwhelmed them. Doctors set up a makeshift tent and took over a second ward to care for the newcomers. Patients were stacked three to a bed, racked with fever and pain.

Ebola is transmitted through any bodily fluid—blood, sweat, tears, semen, mucus, vomit. Kenema hospital had protective Tyvek suits, gloves, and masks on hand, but the gear was poorly distributed, and doctors and nurses started to fall ill and die themselves.

That outcome wasn't foregone. Though their expertise hadn't yet reached Kenema, aid groups like Doctors Without Borders were learning to treat Ebola while keeping health workers safe. They were also learning to save people who were already infected.

When the virus enters the body, it induces a total overreaction in first-responder immune cells. They send a torrent of panic signals that trigger a physiological disaster: fever, pain, vomiting, diarrhea, and—if left unchecked—death. The infection moves so fast that the body's second phase of the immune response—making antibodies that attack the virus—never has a chance to kick in. So Doctors Without Borders clinics figured out that they could reduce Ebola's lethality with intense supportive care: Keep patients alive long enough—with antibiotics, acetaminophen and other pain medications, vitamins, and oral or intravenous fluids—and their bodies would have time to start fighting the disease. The protocol treats dehydration and weakness and, combined with soft drinks, food, and water, helps the majority of patients survive. "There's nothing more joyous than when someone says, 'I'm hungry, give me rice.' Then you know you're going to be OK," says physician Kirrily de Polnay, who worked with Doctors Without Borders.

In the meantime, as people get sicker the bodily fluids that carry the disease start pouring out of them in ever greater volumes. So everything about a Doctors Without Borders Ebola treatment center is designed to cut worker risk. A water system dispenses two strengths of chlorine solution through dedicated taps. Access to patients is strictly controlled; workers get to the ward through only one entrance, and they leave through a single exit where they are sprayed down with bleach. Two layers of fences separate the sick from the well by 2 meters—far enough to protect from projectile vomit. And rules govern everything: from which chlorine solution is used to wash boots (0.5 percent) or dishes (0.05 percent) to how long workers can stay inside with patients (one hour).

At the start of the outbreak, Kenema Government Hospital didn't have any of those precautions in place. They weren't ready. Patients were leaving the wards to lie on the sidewalks, trying to escape the heat and misery inside.

One day in June, Moses saw a nurse, Alex Moigboi, caring for patients in the Ebola ward. He was wear-

ing completely inadequate gear: just a plastic apron and a pair of gloves over his scrubs.

"Alex, what are you doing in there?" Moses shouted.

"What else am I supposed to do?" Moigboi shouted back angrily. He hadn't been able to find the gear.

Moses ran to her lab to get it. She told Moigboi to call her next time before charging into the ward. It didn't do any good. Like so many of Moses' friends, Moigboi died a few weeks later. Khan, too, got infected. He died on July 29. They buried him in a grave overlooking the lab.

Moigboi's death hit Moses especially hard. He was such a sweet, selfless kid. He was one of the first nurses to become infected, because he was one of the most dedicated, dutifully caring for patients when everyone else was scared away by the impossibility of the task. "You think that the really good people are going to pull through—that there's got to be some justice," Moses says.

Eventually aid groups arrived and started implementing measures they hoped would alleviate the problems. The World Health Organization built chlorinating stations throughout the Ebola unit. Doctors Without Borders helped with water and sanitation. The Red Cross helped with screening patients.

Still more nurses got sick. In the fall of 2014, Kristian Andersen, one of Moses' colleagues back in the US, was just getting off a phone call with a friend in Kenema's Ebola ward. Andersen, a geneticist at the Broad Institute in Cambridge, a research center affiliated with Harvard and MIT and part of the same consortium of virus-hunters as Tulane, had helped with the diagnostic lab at Kenema. Back in Cambridge, he was using leftover diagnostic samples to study the genetic sequences of the Ebola virus. As Andersen hung up the phone, he thought, "We've got to do something."

It dawned on him: The patients held the answer. If they survived, they carried antibodies that targeted the very viruses that had almost killed them. The samples he'd been working with didn't contain antibodies, but if he could get blood from survivors, he might be able to figure out how to make the same antibodies that their immune systems had produced. It would not be easy or fast, but he couldn't stand by while more people lost their lives—if not in this outbreak, then in the next one, or the next one after that. It was time for a new plan.

[S]

SESAY SPED out of Bo, trying to make up time. Half an hour later, Moses got a text from Augustine Goba, who ran the lab at Kenema. Freetown was under quarantine. "Go straight to the Lungi airport," Goba wrote. "They do not have a pass for the shipment to go out tonight." In other words, it didn't matter if they got to Freetown in time for the ferry, because the ferry wouldn't take the samples. That was actually good news. Moses preferred to stay in control of the samples for longer, and if they made for the airport directly they had more time. Sesay adjusted their course, and for the first time that day Moses relaxed, watching the villages and countryside out the window. It was mostly small fields hacked out of the tropical forest. But she couldn't see anyone out planting or harvesting. Every hour or so the car would pass another Ebola treatment center or a fenced-off cluster of tents—a quarantined holding place for patients suspected of having the disease.

At the turnoff for the airport road, Moses looked for the long trains that usually ran alongside, pulling loads of iron ore to ships in the harbor. This one sign of progress in Sierra Leone's faltering economy usually heartened her. But no trains passed. Ebola had switched the country's economy off.

At 2 pm, Sesay pulled up to the loading dock at the airport. A shipping agent—Moses only knew him as Richard—emerged from the office. His red dress shirt and crisp black pants implied his official capacity. Moses opened the Toyota's rear door and reached for the dry shippers safe inside. But Richard, aghast at the idea of a white woman performing manual labor, grabbed them. Moses reached into the Prado for the paperwork and handed off four copies of the documents affirming that her samples were free of Ebola, tested before freezing at Kenema. Now the shipping agent was responsible for getting the samples on the flight. It was supposed to depart at 7:20 pm. The next flight wouldn't leave for four days.

Moses checked in to a hotel half a mile away. It was high-end by Sierra Leone standards—the room had air-conditioning and a flatscreen TV. Exhausted but too nervous to rest, Moses sat on the double bed and opened her laptop. She clicked to a spreadsheet and started typing in data from a Lassa study, a task she could do with half her brain while the other half worried about the samples. She texted Richard: "Have the packages been cleared for shipment?" He didn't reply.

Moses had been walking down to the hotel lobby, which had Wi-Fi, to check her email. Six o'clock came and went, and she still didn't know whether



| 4 |

Photos from Sierra Leone taken in August 2014 show specially clad workers handling infected bodies, as well as relatives of the victims.

| 1-2-3-4 |

the samples were on the plane. Moses tried to stay calm. Her samples had to be loaded in less than an hour or they'd miss the flight. This was where things had gone wrong the last time. Researchers halfway around the world were watching their phones for word that they'd have material to work with. The sooner they could start, the sooner they could save lives. An undotted *i* or uncrossed *t* could sink the project. Again.

Schieffelin called. Moses told him what was going on but asked him to keep it quiet. "I'm not going to tell anyone unless it looks like it's become an actual problem," Moses told Schieffelin. "I don't want anyone freaking out."

"That's probably a good idea," Schieffelin replied.

[W]

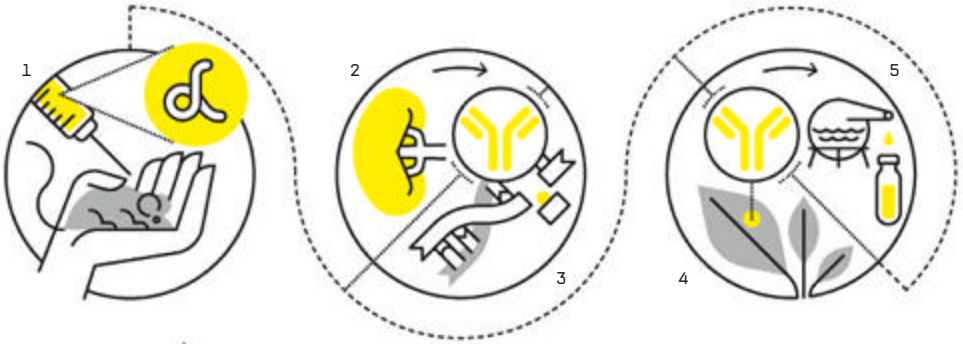
WHILE MOST PATIENTS in the recent Ebola epidemic had at best 60–40 odds of surviving, one group had much better chances: people evacuated to Western nations. "Supportive care" means something very different at a university teaching hospital in the US than it does in Kenema. The evacuated Westerners had ventilators, dialysis, and more comfortable digs.

Most of them also received at least one experimental treatment. Many such unproven drugs exist for Ebola. Clinical use didn't help validate them because different patients with different symptoms got them at different stages of the disease, often in combination with other therapies both proven and unproven.

One popular approach, though, has been the use of serum—fluid derived from the blood of Ebola survivors, which contains antibodies against the disease. Antibodies are big Y-shaped proteins that kill invaders like bacteria and viruses. Any animal with bones has an immune system that makes them, and they're essentially programmable; the immune system reads the proteins in the shells of germs and builds antibodies specific to them. Once your body knows how to make antibodies specific to a disease, it never forgets, which is why if you had chicken pox as a kid, for example, you don't get it again.

So physicians use survivor serum in the hope that amid the trillions of antibodies an adult human can make, the ones that fight a specific disease will be in the mix. It's not a new idea. The doctors who fought a 1995 Ebola outbreak in the Democratic Republic of the Congo tried survivor serum in eight patients. But the stuff is difficult to gather and distribute, and no formal trial has ever proved its benefit.

Over the years, researchers have begun making antibodies in labs. They infect mice or rabbits with the pathogen in question, then stick the cells from the animals' spleen—the spleen being a font of antibody generation—to blank, modifiable antibodies derived from a particular kind of tumor cell. From there, scientists find and purify the antibodies they need, using various screening techniques until they have a batch that fights exactly the disease they want. Drugs based on these so-called monoclonal antibodies have become a lifesaving mainstay of modern medicine, fighting



ZMAPP

Combines antibodies from two older drug cocktails, MB-003 and ZMAb. Seven people received this experimental formula in 2014 over the course of the outbreak; five survived.

How to Make It

1. Inject mice with components of the Ebola virus.
2. Extract monoclonal antibodies—Ebola-seeking immune molecules—from the mice's spleens.
3. Grow the monoclonal antibodies in culture, in a lab. Splice those antibodies with human DNA to create chimeric Ebola-hunting antibodies.
4. Insert antibodies in genetically engineered tobacco plants to grow for one week.
5. Harvest the plants and purify the antibodies to be formulated for injection.

EBOLA THERAPY

by LEXI PANDELL

The West Africa Ebola outbreak has taught virus hunters that the disease often kills by triggering a disproportionate immune response. If people get treated, their bodies may start fighting the actual virus. But if you could build a drug that replicates the antibodies produced in that secondary immune response? That's the strategy behind the best-known experimental therapy, ZMapp. An even more experimental approach sequences genes in the blood of Ebola survivors to find the ones that make the antibodies themselves.

GORAN FACTORY

illnesses as disparate as cancer, arthritis, and lupus. But it takes a long time to make them, partly because of the years it takes to find and reverse-engineer the best antibodies in lab animals and cells.

Still, this idea is the principle behind an antibody cocktail called ZMapp, which seven Ebola patients received in 2014. To make it, scientists infect mice with an Ebola virus from a previous outbreak and then collect the mice's antibodies, choose the ones that seem to work best, and purify copies to give to humans.

Back at Tulane, an immunologist named James Robinson was already planning to try to make a better ZMapp—from humans instead of mice.

RESEARCHERS JUST NEEDED HUMAN SURVIVORS. THEIR BODIES HAD ALREADY DONE ALL THE WORK.

First he'd have to copy DNA from survivors' B cells, the white blood cells that make antibodies. Then he'd insert that DNA into human embryonic kidney cells in the lab. That would turn those kidney cells into "clones" of the B cells—some of which would make antibodies to Ebola.

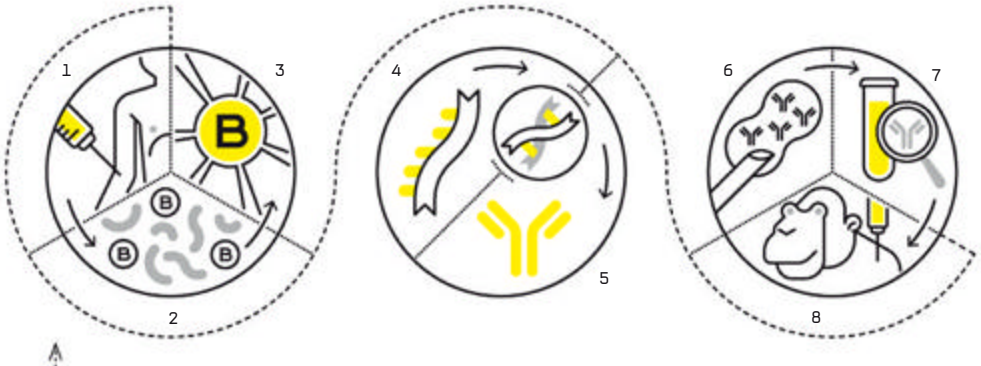
Once he knew which cells, Robinson could sequence their DNA and find the specific genetic instructions for making the right antibodies. Then a colleague could copy those genes into yet another round of cells, these derived from mouse-myeloma cells—a type of mouse cancer that turns out to be particularly well-suited to pumping out antibodies. Those would make the actual medicine.

If it works, the resulting drugs will be tailor-made to combat the same virus that is causing this Ebola outbreak, which means it might work better than ZMapp. But the entire process could take months or years. And making antibodies isn't easy; that's why the miniscule supply of ZMapp ran out early in the epidemic.

In fact, antibodies are among the most expensive medicines in the world, costing as much as $500,000 per year for one person's course of treatment. That's a prohibitive price tag—especially for diseases like Ebola, which mostly kill people in poor countries. Rich people don't typically get Ebola, so drug companies will never be able to charge enough to recoup the astronomical cost of developing medicines for it.

Andersen planned to tackle this bigger problem at the Broad Institute. He had an idea for a shortcut: Instead of copying antibody-coding DNA into other cells, he'd sequence it and pick out the stretches that seemed most likely—according to a computer model—to make antibodies specifically tuned against Ebola. In theory, that would save months of work. You wouldn't need all those rounds of clones. You'd just find the Ebola antibody genes, put them into new cells, and start churning out a drug.

Andersen wasn't the first person to think of this angle, but no one has ever been able to pull it off. A human has hundreds of millions of antibody-



THE NEW METHOD

An antibody cocktail derived from the blood of survivors. This production method should be much faster than the ZMapp method, but it may take years to figure out if the new drug works better.

How It Works

1. Draw blood from Ebola survivors.
2. Separate out the antibody-producing B cells, a type of white blood cell.
3. Stimulate the memory B cells, a subtype formed after primary infection, and screen the resulting cultures for antibodies against Ebola glycoproteins.
4. Extract RNA from the antibody-producing cells. Then use gene sequencing technology to read the RNA and build from it complementary DNA.
5. Clone that DNA into plasmids, self-replicating DNA molecules that contain the genes for the two protein chains that make up the monoclonal antibody protein.
6. Insert the plasmids into mouse-myeloma cells that can produce the monoclonal antibody in quantity.
7. Collect and purify the antibodies and formulate them for injection.
8. Test the antibodies in animals. In the future, researchers hope to make the antibodies directly from B cell genetic sequences.

making cells. Years ago, researchers could only sequence a few hundred of those cells at a time. Decoding the complete set would have taken way too long and been cost-prohibitive.

But the cost of sequencing genes has plummeted. And because places like the Broad Institute have so many sequencers, the process is much faster.

What Andersen has proposed doing would completely upend the economics and mechanics of the pharmaceutical development pipeline; if successful, he won't need to spend years in the lab to find antibodies against Ebola. He just needed human survivors; their bodies had already done all the work. Modern sequencing technology could find the information he needed.

Plus, if it works, Andersen's approach could become a faster, cheaper way to make new antibody medicines not just for Ebola but for any disease—bacterial, viral, anything a person's immune system might ever gin up an antibody against. If the process works for one pathogen, it should work for all of them. Antibody drugs wouldn't be haute couture anymore; they'd be ready-to-wear, cheap and widely available.

To test his hypothesis, though, Andersen needed one key ingredient: the blood of people who had survived Ebola.

[B]

BACK IN HER HOTEL ROOM near the Lungi airport, Moses watched the clock on her laptop creep closer to 7:20 pm. That's when a plane would—hopefully—take off with her cargo. As the minutes ticked past, she heard nothing.

The time came and went; silence. No word on whether her shipment had made it on board.

Finally, at 7:45 pm, Moses reached Richard. Her samples were on their way.

But the next day, there was bad news: a one-day delay at the Brussels airport. Then there were more setbacks. When the dry shippers got to Chicago they spent two days making their way through customs. The packages should technically have stayed cold for another eight days after that, but they had been sitting in 80-degree heat for hours at the Lungi airport, and that had probably shaved a few days off the samples' shelf life.

Even though she knew she couldn't do anything about it, Moses would find her mind wandering back, again and again, to an image of her samples in transit somewhere, heating up degree by degree before anyone ever opened the box. She tried to put the idea out of her head.

Finally, on January 19, she got an email from Robinson, the Tulane researcher who would receive the parcel and begin disbursing its contents to the consortium: "The samples have been safely transferred to liquid-nitrogen storage tanks," he wrote. "What a relief!"

[O]

OF COURSE, the task of developing an antibody drug against Ebola was even harder than getting blood from Sierra Leone to the US. Four months after Moses' samples reached New Orleans, Andersen stood at a whiteboard in a Tulane lecture hall, visiting his colleagues on the project. The survivors' samples were in a freezer one building away. This was the closest Andersen had ever been to them.

In fact, he hadn't even started working with them. In August, Andersen and a colleague at the Broad, a geneticist named Pardis Sabeti, had published a controversial paper that used data from Ebola gene sequences to calculate how fast the virus was evolving. Now, nine months later, Andersen was scribbling graphs on the whiteboard, defending his position in front of a room packed with many of the people working on understanding and fighting the disease—Moses, Robinson, and Garry among them.

But the debate was mostly technical. Everyone agreed that the longer the epidemic lasted, the more the Ebola virus would change. That meant stopping it soon, before it outran any new therapy, was all the more urgent. Andersen was on his way to a new job at the Scripps Research Institute in San Diego to attempt just that. He wanted to get to work.

Robinson, meanwhile, had gotten a little further. He'd been copying DNA from the survivors' samples and pasting it into cells in a lab. So far, it seemed to be working. His lab had become a mini factory full of cells churning out antibodies. The method was supposed to take longer than Andersen's, but for the moment Robinson was ahead.

Moses, watching Andersen write equations on the board, wasn't getting her hopes up too much. Even as the epidemic in West Africa had waned, it stubbornly refused to end. Some scientists had begun to wonder if Ebola would become endemic, flaring up in some spots for years. If that happened, a drug would help, but watching her colleagues bat around mutation rates reminded her that they had a long way to go.

That was just the nature of the job, though. Sometimes Moses thought that working in Sierra Leone was like spending time in a biosafety level 4 laboratory—the high-security fortified lab in which scientists handle the most deadly contagious diseases. Before you even go inside a BSL-4 lab, you have to plan even the tiniest part of your experiment: which forceps you'll use, how much distilled water you'll need. Because once you suit up and go in, you can't just pop out and grab something you forgot. You have a plan and a purpose. So you have to believe going in that you know what you're doing, that you're there for a reason. And you stay inside until you've finished the job.

COLOPHON

SNEAKY MOVES AT WORK THAT HELPED GET THIS ISSUE OUT:

Finding headspace every day at 4:20 in the wellness room; surreptitiously placing action figures on people's desks; power naps; slipping into that narrow gap to beat the lunch line; white text on white background; running to the office early enough to start the workday with a shower instead of a cup of coffee; distributing chocolate to the designers and fact-checkers working late (because chocolate); nabbing cookies from the kitchen; saving all my [redacted] to [redacted]; using the interwebs to prove that a caller was impersonating a nonexistent attorney; the totally illegal but very time-savvy left turn out of the WIRED parking garage; learning the distinction between square meters and meters square; Control + Option + Command + 8; asking a reporter for their notes; "I have never done anything sneaky."

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THE GREEN GURU: THE GEICO GECKO UNCOVERS HOW THINGS WORK

Your phone won't get a good signal during a flight, but in-flight Wi-Fi service works. How is this possible?

Years ago, major airlines started offering in-plane Wi-Fi services. Nowadays, it's something we've all come to expect, especially on those cross-country flights. But how does a plane moving at 575 mph stay connected while 6 miles up in the air—without a really long Ethernet cable?

There are a couple of ways in-flight service providers keep planes connected to the Web. Most common is a network of special cell towers placed across the U.S., blanketing the nation's airspace with connectivity. Unlike normal cell towers, these beacons beam cellular signals into the sky, where it's picked up by an antenna on the underbelly of the plane.

That's the "old" way. The next generation of in-flight Wi-Fi will be delivered by satellite. There are no special cell towers in the sea, so satellite services will provide Web access to planes over the ocean and tower-free land. Satellites should also provide faster and more robust in-air connections. In time, this technology should really... take off. Visit GEICO.com and save 15% or more from 30,000 feet.

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Boy, Interrupted

CONTINUED FROM PAGE 91

than a dozen medicines to market. He knew more about cannabis than almost any executive in the world. And in more than 30 years as a biotech CEO he had built a reputation as a maverick—someone attracted to the thorny, controversial pharmacological issues that most executives try to avoid. Guy had been thinking about starting a company to make medicines from cannabis since the early 1990s.

Back then, UK regulators said they would never approve it. But by the middle of the decade, the British political landscape had shifted significantly. The courts were clogged with the cases of multiple sclerosis and cancer patients who'd been arrested for using cannabis to combat things like muscle spasticity and the nausea from chemotherapy. Politicians and activists were calling for partial legalization.

And so, in July 1997, Guy found himself at a joint conference of the Royal Pharmaceutical Society and the Multiple Sclerosis Society. Onstage were top UK doctors and regulators wondering aloud what it would take for a company to make a cannabis pharmaceutical. Guy raised his hand and explained how he thought it could be done. A year later, in June 1998, Guy and cofounder Brian Whittle got permission to start GW. "It was like a wormhole opened up and we'd spent the previous 10 years studying wormholes," Guy says.

By 2012, GW was one of only a handful of firms in the world doing legal, drug-company-quality research on cannabis. It owned enormous hothouses containing thousands of cannabis plants in legal but undisclosed locations southeast of London. It had modern labs converting the plants into medicinal extracts and a factory that could turn them into sprays, tinctures, and pills. It had 177 employees and $51 million in revenue. And it was manufacturing its first drug, Sativex, already approved for sale in the UK, Canada, and 22 other countries to treat MS.

Back in the UCSF conference room, we finalized our plans: Evelyn would take Sam to London, where he would try pure CBD pills made especially for him. He wouldn't be the first person to try pure, pharmaceutical CBD for epilepsy. Four small studies between 1978 and 1990 had tried it on a total of about 40 people. Surely others had tried homemade concoctions. But he'd certainly be the first kid, and arguably the first person in more than 20 years, to try CBD of this purity for epilepsy. We hoped it would work for Sam and that many other patients like him would follow.

SETTLING INTO London, Evelyn was almost afraid to believe how well the treatment seemed to be working. After having 68 seizures on Thursday, the day Sam and Evelyn spent at the Great Ormond Street Hospital, Sam had 10 on Friday and five on Saturday, 10 on Sunday and six on Monday. And as she increased the dose of CBD from 50 mg a day to 250 mg a day, his seizure count continued to fall. They didn't see any side effects.

Sam's seizures decreased so quickly—in less than 24 hours—that two days after he took his first pill he was zip-lining 30 feet in the air above a carnival spread out over half a mile in Hyde Park. He was harnessed, so he couldn't fall. And because he has a weakness for the scariest ride in any amusement park, Evelyn couldn't say no.

At first we said nothing to family or friends. We worried that, like so many promising treatments we'd tried, the effect would be only temporary. But by December 28, 2012, eight days after Sam's first pill, it was obvious that we were witnessing something fantastic. "Best day yet," Evelyn wrote to friends and relatives. "Today Sam had a total of three seizures—short, seconds-long. From our starting point of SIXTY-EIGHT seizures. I would say we are doing very well. And we can go higher on the dose if we like. Along with being nearly seizure-free, Sam is more mature, more relaxed, and funnier. No idea if that is a physiological effect or just a result of not having his train of thought interrupted all the time, but who cares … I love to see all that come out."

Our euphoria lasted only two weeks. The trial was ending, and Guy wasn't going to let us take any CBD back to the US. On January 2, 2013, he emailed Evelyn telling her that he'd be sending one of his executives by the hotel to pick up the unused pills.

We knew to expect this, but it was still excruciating. Two weeks into enjoying the best seizure control of Sam's life, we were being asked to give back the medicine that got him there. We had cobbled together a plan to manage Sam's seizures during the time it would take us to obtain permission and cooperation from UCSF, the FDA, and the DEA. We hoped that would happen in less than six months, as we'd been told. But no one knew for sure. When you've found the first medicine in seven years that controls your child's debilitating illness, not having it for an hour feels too long.

What we used to control Sam's seizures during that time seems irresponsible in retrospect. A few weeks before we left for London we'd found an outfit in Colorado that claimed to make CBD pills from hemp. They seemed to help Sam a bit, and the company was willing to send the pills through the mail. Testing showed a CBD-to-THC ratio of 18:1. But we didn't have any idea where they were getting their raw material. We didn't know whether their manufacturing process was clean. A month's supply cost more than $1,000. At the time it seemed better than putting Sam back on steroids.

THE AGENTS from the DEA appeared without an appointment at Cilio's UCSF office door on March 1, 2013. They showed her their badges, asked permission to question her, and made it clear that this was not going to be a friendly conversation. "They asked a lot of personal questions: Where was I from? Had I ever used (illegal) drugs?" she says, adding that it made her feel like she was part of a TV crime drama.

The questioning, which went on for two hours, got particularly tense when the agents asked Cilio how she planned to dispense the special drug. "I said that I would keep it here in my office and then put it in my purse and walk across the street to the clinic to see my patient. And they said, 'You have no idea what you are talking about. This is a Schedule I drug. It's like heroin. You can't cross the street with it in your bag. You have to keep it in your office, and you have to give it to the patient in your office.'"

As part of the special license application process, she'd been briefed by UCSF security and demonstrated to the agents that she understood how the locks and alarms worked in her office suite and building. They weren't satisfied with this either. They took pictures of the furnishings in her office, including the cabinet she told them she was going to store the medicine in. They told her she would need a safe.

I was both elated and panicked when I heard about the agents' interview. Setting up a site visit by agents is notoriously slow. Our application had been live for only about eight weeks. But I worried the DEA's demand for a safe would suck our application into a bureaucratic quagmire. I had initially thought the agency would be satisfied with a cheap jewelry safe I could buy at the hardware store. I was wrong.

According to government regulations, the safe needed to be certified for "30 man-minutes against surreptitious entry; 10 man-minutes against forced entry; 20 man-hours against lock manipulation; and 20 man-hours against radiological techniques." What this means in English is a 3-foot-square steel box that weighs 965 pounds and looks like something the Road Runner used to drop on Wile E. Coyote. But it never occurred to me that you could buy one. Would UCSF actually pay for something like this? Even if it would, I envisioned months of paperwork just to get the university's approval.

It turns out that used safes are not hard to find. Cilio said that if I bought one, she'd gladly put it in her office. UCSF officials said it was OK as long as the safe didn't violate building load limits. And within a day I was the proud owner of a used blue Meilink TL-15 plate safe

with a group 1R lock. And by week's end I'd had it delivered to Cilio's office. The cost for unraveling this bureaucratic knot: $2,100.

THE DEA approved our application on March 19. Between getting import permits, clearing customs, and Cilio's unrelated attendance at an overseas conference, another six weeks passed. Sam took his first CBD pill in the US on May 4, three weeks before his 12th birthday.

The total bill for getting GW's CBD into the US was roughly $120,000, not including travel. Two consulting firms—one an expert in the workings of the FDA, the other an expert in the DEA—generated most of those expenses. It's an enormous amount of money to pay for outside help, more than double what we'd thought it would cost.

But it's hard to imagine how we could have done it without them. Cilio had dozens of other patients to attend to besides Sam. And because she was new to the US, she had no idea how complicated and emotionally charged anything associated with cannabis can be here. The consultants showed her how to fill out the mountain of paperwork involved in applying to the FDA and the DEA. And they worked their contacts inside the agencies to make sure our application kept moving. The DEA agents, despite being antagonistic with Cilio and demanding that we get a safe to store Sam's drugs, also moved our application along quickly when we speedily met their demands. The day we had the safe delivered to Cilio's office, an agent visited to ensure it met DEA requirements. And he immediately advanced our application to the next step.

We wouldn't have even known that consultants did work like this had Steve Willard, a Washington, DC, drug company entrepreneur, not introduced us to them. Sam now says he's his best adult friend, even though he was my dad's friend first.

Usually, getting access to experimental drugs that are potentially lifesaving doesn't work this way. With terminal cancer patients, for example, oncologists know what new drugs are in development and have a mechanism already established to work with a company and quickly get FDA approvals. Yet GW was supplying drugs that were illegal in the US. No US hospital would take on a project like this.

But it appears our enormous bill for helping Sam has also jump-started the development of what doctors tell us could be one of the most exciting new drugs to treat epilepsy in a generation. Within a month of our return from London in early 2013, Guy and GW started talking to epileptologists at four other US hospitals about doing studies with their sickest kids. And on January 26 in New York City, 15 doctors, researchers inside and outside the US government, and GW officials sat in a conference room at NYU and began mapping out a strategy.

Those initial investigations—five hospitals, 25 kids apiece—proved so encouraging that GW last year expanded them to what it expects will be 1,400 patients at more than 50 hospitals in the US and the UK by year's end. The drug now has a name—Epidiolex—though for a day or two Guy talked about naming it after Sam. It has a fast-track designation from the FDA, meaning that it could be available at Walgreens inside of three years.

Epidiolex is not a miracle cure. The most recent data, out in April, shows that of 137 kids who tried it for 12 weeks, it helped about half, reducing their seizures by at least 50 percent, with 9 percent becoming seizure-free. This is a better response rate than it sounds. All of the patients in the trials are those like Sam who had already run out of conventional options. But it is also a reminder that CBD, Epidiolex, or any seizure drug doesn't help everyone.

Today CBD's potential for treating epilepsy has become an important story in medicine. In August 2013 Sanjay Gupta, CNN's chief medical correspondent, reported on a cannabis strain that had all but cured Charlotte Figi, a 5-year-old girl with Dravet syndrome, one of the worst kinds of epilepsy. Figi was in a wheelchair, on a feeding tube, with a do-not-resuscitate order before her parents started experimenting with high-CBD cannabis in 2012. The oil, supplied by a group of evangelical Christian brothers in Colorado Springs named the Stanleys, helped her almost immediately. Figi quickly went from 300 grand mal seizures a week—an average of 40 a day—to about four a month.

That cannabis documentary on CNN, a second in 2014, a third in April this year, and a week's worth of editorials in *The New York Times* in 2014 have ignited a national conversation not just about CBD for epilepsy but about whether it is time to legalize cannabis entirely. Twenty-three states have legalized medical cannabis, 18 states have decriminalized recreational cannabis too, and four states have made recreational use completely legal. Expect at least five more states, including California, to put complete legalization to a vote in 2016. And bills in Congress to change the laws on a federal level, which at a minimum would make it easier for researchers to study cannabis in the lab, are getting traction for the first time.

Edward Maa, a neurologist at the University of Colorado, Denver, is doing the first study of the Stanley brothers' strain, now called Charlotte's Web, to get data on its effectiveness. He has 14 Dravet patients so far. The Stanleys now ship Charlotte's Web across state lines, because the cannabis has so little THC that it is considered hemp. The operation has 3,508 customers, about a third of them kids with epilepsy.

Little of this was happening four years ago, when Evelyn and I first started using cannabis and epilepsy in the same sentence, and watching Sam's life unfold alongside it has been profound. Sam isn't seizure-free, but he's close, like he was in London. He has between zero and five seizures a day, and he's been off all other antiepileptic medications for almost two years. GW makes Epidiolex only as a liquid now. Sam takes 3.5 ml at breakfast and dinner. Evelyn and I are still thinking about how we can eliminate the last of the seizures. Sam is, perversely, more frustrated by these episodes than when he was seizing every few minutes. Back then he was in a fog. Now, because he is so close to being seizure-free, he feels each disruption more keenly. He increasingly understands that if we can't get the remaining few to go away, he won't be able to drive or ride a bike.

But for the first time in a decade—since he was in preschool—he is living like a normal boy. He takes a bus and a train home from school in San Francisco every day. He's studying to be a bar mitzvah next year. He plays *Halo* at his friend Brian's house on Friday afternoons. Before school let out for the summer, he was doing more sports than he actually had time for. He fences three times a week. He was on his school's indoor soccer team. And he runs a nine-minute mile. Sure, he's about 5:15 off world-record pace. But he could barely run 100 yards without seizing three years ago. Last summer we went fly-fishing and rock climbing with ropes. He makes up songs in the morning before school.

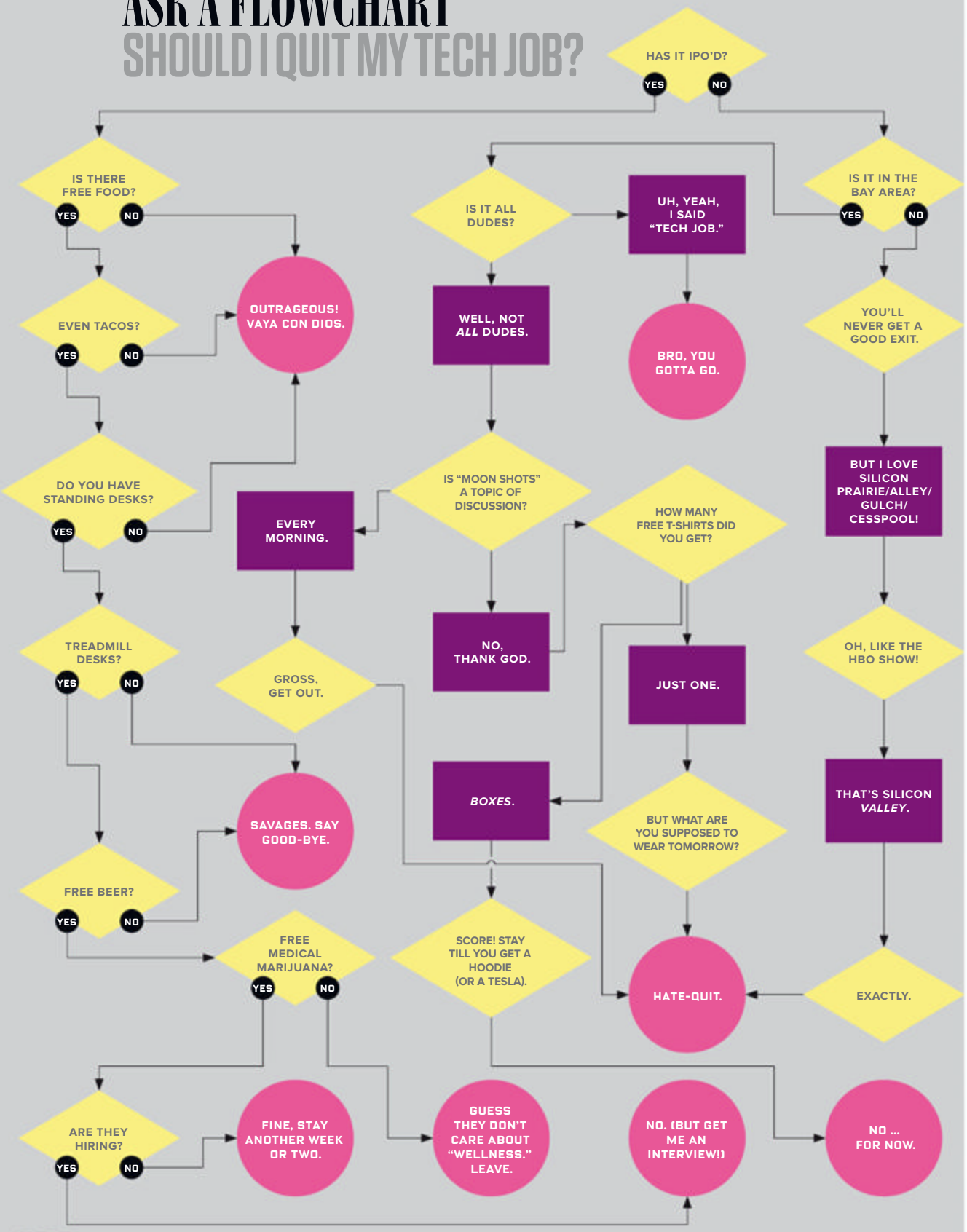
And he is turning out to be a smart, thoughtful kid. Lately on car rides he asks me questions like this: "Why does everything have to cost money? Why can't it all be free? Money is just paper. What do we need it for?" Or "Why are we here? Where did we come from?" He is arguably late asking such questions, but that doesn't bother me. For most of the past decade I was worried Sam would never be well enough to even formulate thoughts like this. And he was very clear about the fact that he wanted me to write this story. "People need to know what this looks like," he told me when we discussed it. He recalled one of his earliest memories of having seizures in kindergarten: "Do you know what it's like to be line leader, have a seizure, and wake up with everyone yelling at you?"

Listening to him talk like this or hearing Evelyn recall her conversations with him is bittersweet. Most of us spend our childhood blissfully thinking that our parents can solve most of the big problems we face. Sam had to find out way too early that sometimes that's just not true. I hate that he had to learn that lesson so soon. I hope surviving it will give him the inner strength to better handle life's other beanballs.

All of it makes me recall a conversation I had in 2009 with Doug Nordli, an eminent Chicago epileptologist. He made a point of saying that, as hard as we might find it sometimes, the one thing we should never do is become hopeless about Sam's seizures. This wasn't just a pep talk. He said that he'd seen kids like Sam rebound with astonishing speed once their seizures were brought under control. I wanted to believe him, but back then I just couldn't. Now I see proof every day of how wrong I was. W

BY ROBERT CAPPS

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